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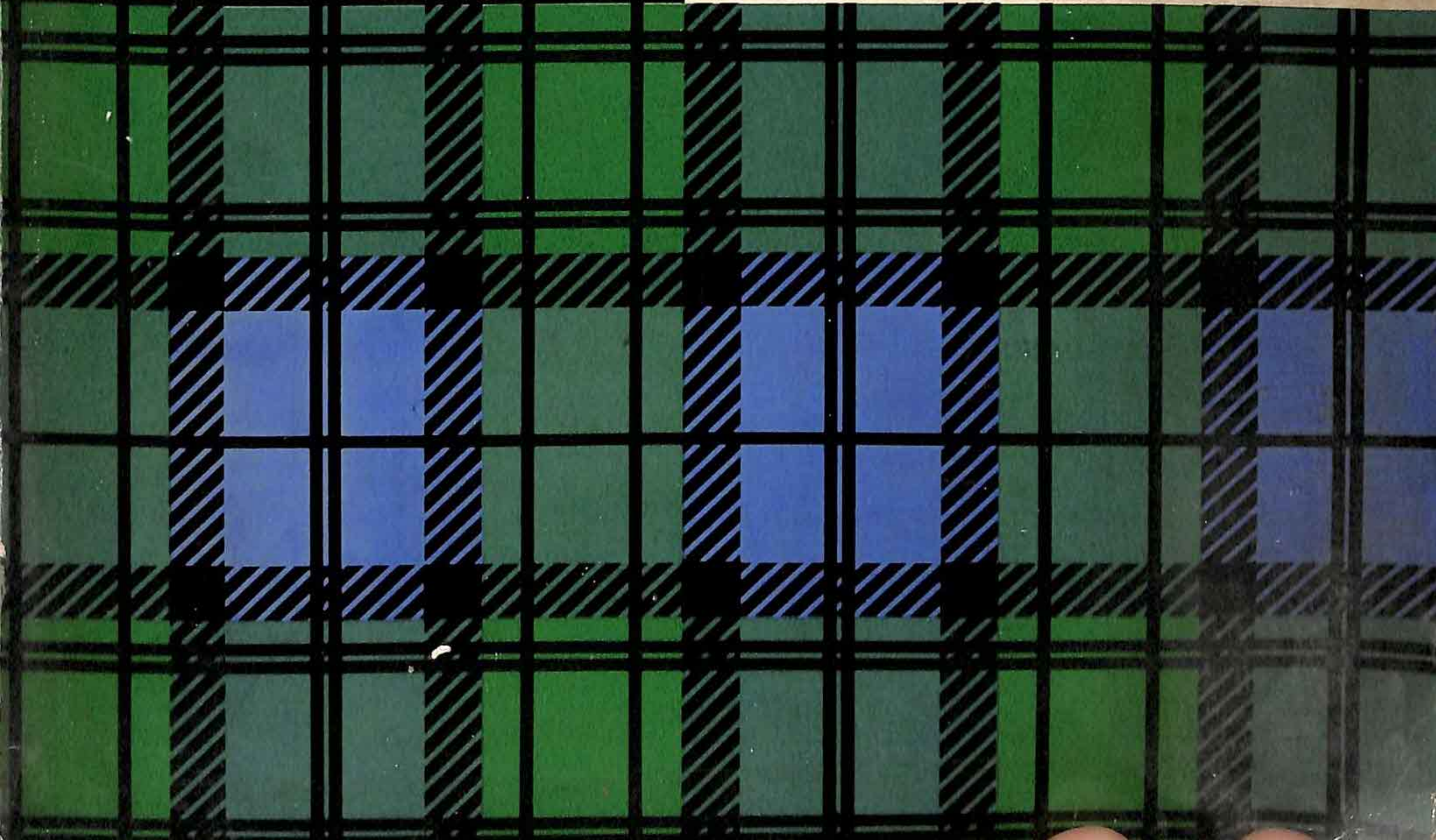

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Programmed Learning Aid for

INTRODUCTION TO PSYCHOLOGY

Programmed Learning Aid for

INTRODUCTION TO PSYCHOLOGY

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FOREWORD

Each of the books comprising the Programmed Learning Aid Series is in programmed learning format to provide the reader with a quick, efficient, and effective means of grasping the essential subject matter.

The specific benefits of the programmed method of presentation are as follows:

1. It keeps the reader *active* in the learning process and increases his comprehension level.
2. Incorrect responses are *corrected immediately.*
3. Correct responses are *reinforced immediately.*
4. The method is *flexible.* Those who need more "tutoring" receive it because they are encouraged to reread frames in which they have missed any of the questions asked.
5. The method is *fun* to use since it makes learning seem like a game.

The method of programming used in this PLAID on introduction to psychology and in most of the other PLAIDS is unique and simple to use. The reader begins by reading Frame 1^1 in Chapter 1. At the end of that frame he will answer the True-False questions given. To determine the correctness of his responses he merely turns the page and examines the answers given in Answer Frame 1^1. He is told *why* each statement is true or false. He should use his performance on the questions given as a measure of his understanding of all the materials in Frame 1^1. If he misses any of the questions asked, he is encouraged to reread Frame 1^1 before continuing on to Frame 2^1. This same procedure should be used throughout the book. Specific instructions are given throughout as to where to turn next to continue working the program.

The reader may desire to go through the PLAID a second time, leaving out the programming questions and answers. Or he may desire to further test his understanding by going through it a second time, answering all of the questions once again and rereading only those frames in which his comprehension is unsatisfactory.

The author of this PLAID on introductory psychology is professor of psychology at The Pennsylvania State University. He is the coauthor of the book *Motivation: Theory and Research,* and edited and coedited two books on verbal learning and verbal behavior. He has published a number of research papers in the areas of memory, verbal learning, and problem solving. His teaching experiences range from introductory psychology, which he has taught many times, through upper division courses in psychology, to graduate seminars in subjects of his interest and specialization.

ROGER H. HERMANSON
Coordinating Editor and Programmer

PREFACE

This *Programmed Learning Aid for Introduction to Psychology* is designed to provide an overview of the material contained in leading textbooks used in introductory psychology courses. The Aid is not a substitute for these books, which typically include eight or nine times as much text as does this PLAID. The PLAID provides the major points and some of the supporting material that standard textbooks include. It should be useful for a quick review of introductory psychology, either as a supplement to a larger text as you take the course or as a means of reinstating material in preparation for taking an advanced course in psychology for which the introductory course is a prerequisite. I undertook to write this PLAID as a way of preparing myself to teach the introductory course, after a lapse of some seven years.

Three examinations, one for each set of six chapters, are provided, with answers; there is also the self-testing feature in the programmed learning format which will help you check on your understanding of, and your memory for, the material as you go along. You should be able to work through the typical chapter in from 15 to 45 minutes, and through one of the tests in perhaps a half hour.

The topical arrangement follows an order fairly close to that found in most introductory textbooks for psychology, and an alphabetical listing of the topics is provided so you can find the major ones in the PLAID when you wish to review. The glossary-index will be a further help in locating topics and definitions of terms.

I wish to acknowledge the great contribution to the preparation of this manuscript made by Mrs. Esther Jordan. I wish also to acknowledge that in writing this PLAID I am greatly in debt to the work of the many popular introductory psychology textbook writers.

CHARLES N. COFER

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chapter 1

THE NATURE OF PSYCHOLOGY AS A BEHAVIORAL SCIENCE

FRAME 1[1]

HISTORY

Psychology, Hermann Ebbinghaus once said, has a long past but a short history. What he meant by this seeming paradox can be expressed as follows. Man's actions, his feelings, his wishes, his imaginings, his perceptions–in other words, what he does, thinks, and feels–have no doubt interested him since the dawn of intelligence. Certainly, the record of philosophy is one of consistent concern with these and related matters in the (roughly) 3,000 years of its existence. There is, then, a long past of man's interest in the psychology of man. But, as a distinct field of study, psychology emerged late, and it is from this emergence that it began to have a history. Some have marked the appearance of psychology as occurring in 1861, the year in which *Gustav Theodor Fechner* published his *Elements of Psychophysics.* Others would delay the date of birth to 1879, the year *Wilhelm Wundt* opened a formal psychological laboratory in Leipzig, in Germany. But in either case, the history is not a long one.

In its past, psychology was a part of philosophy and even of theology, as well, of course, as being a part of everyday common sense, or folk knowledge. In philosophy and theology it manifested itself as the problem of mind and of soul and in folk psychology in various maxims such as "he who learns rapidly forgets quickly," or "redheads have a temper."

Today, psychology is a distinct discipline, one which allies itself to the sciences rather than to the humanities, and it is not satisfied with folk maxims, the truth of many of which it has disproved. Long ago, it gave up concern with problems of the soul, and, while it may still be said to study the mind, its conception of mind and of how to study it differs markedly from the conceptions and methods of philosophy.

Psychology is usually defined as the study or the science of the behavior of human beings and animals, areas of inquiry it shares, in the first instance, with anthropology, sociology, economics, and political science and, in the second instance, with ethology, a branch of zoology. It studies behavior with the methods of science, and it attempts to construct theories of or inferences about mind from the information it attains about behavior.

We can be more specific about psychology's past and its early history and can, at the same time, indicate some of the reasons that psychology changed to be what it is at present.

Psychology inherited some of its problems from philosophy and, at the same time, is heir to conflicting views with regard to those problems from the same source. One of these problems is the concern with how the mind gets its contents, i.e., its ideas or thoughts and its knowledge. One view, dating back to Plato, is that these contents are innately given and will appear if properly drawn out by suitable instruction. This view is called *nativism* or *the doctrine of innate ideas.* The other view, however, proposes that the mind's contents get there because of experience. Without experience, the mind would be a blank tablet. This formulation is called *Empiricism* and was advocated strongly by the British associationist philosophers, of whom John Locke was a major figure. The issue of nativism versus empiricism is not entirely settled to everyone's satisfaction even today, although current opinion would hold that an interaction of the two, not either one alone, is necessary for the development of the mind's abilities, knowledge, and the like.

Biology contributed to psychology's past, especially through the ideas of Charles Darwin, the chief proponent of the theory of *evolution.* After Darwin, it was no longer possible to think of men as a species discontinuous with other animal species. Man thus lost his special place in the world as a unique creature with the result that man, like animals, could be studied with a view to understanding how his capacities and abilities differ from and are the same as those of animals and how his capacities enable him to survive in the struggle for existence.

In the founding of experimental psychology, however, it was actually *physiology,* rather than evolutionary biology, which had the most direct influence. Physiologists in the 19th century, like Müller, Helmholtz, and Hering, began to study *sensations,* such as those associated with sound and light. From them Wundt took the idea of using experimental methods to investigate the mind and from the British associationists he took the viewpoint of empiricism. In his laboratory he attempted to discover the relations between stimulation and sensation and other qualities of experience. His goal was to discover the elementary units of mind, with the processes of association being the means by which the elements were combined to make up the complex contents, e.g., ideas or thoughts and emotions. One of his students, E. B. Titchener, came to the United States to Cornell, where he remained for many years the leading exponent of the *structural psychology,* the view that the goal of psychology was to discover the elements of mind (Titchener said they were sensations, images, and feelings) and the laws of their combination.

Wundt and Titchener used the method of *introspection,* in which an observer attempts to report on his experiences of stimuli in an analytic way. This technique could not be used by children, the insane or, of course, by animals, and even if successful it could show only what the mind is or consists of. Another group of psychologists, the *functionalist school,* objected to the structuralists' goals and methods. The functionalists were Darwinians, and they wished to discover how the mind functions in adapting the individual to his environment. They wished also to study children, animals, and the insane, necessarily extending, therefore, the method of psychology to include observation. John B. Watson, one of their number, eventually argued that it is behavior, not the mind, that is studied by observation, and he pointed out that even with introspection what the investigators can examine are not the sensations, images, or feelings the person has but rather his verbal reports (overt behavior) about them. Watson thus founded *behaviorism* as a movement in psychology. In doing so, he was much impressed with the work on conditional reflexes of the Russian, Ivan Pavlov. Watson saw the conditioned reflex not only as a method but also as the unit out of which more complex habits might be formed.

The early history includes two other schools, *Gestalt psychology* and *psychoanalysis,* along with structuralism, functionalism, and behaviorism, already mentioned. Gestalt psychology opposed all the other schools and argued that the laws of perceptual organization (see below) could provide a satisfactory framework within which psychology can study its problems. Psychoanalysis is a functionalist psychology, but it arose in the study by Sigmund Freud of neurotic people, and its ideas include notions like the unconscious determination of much that we say, do, think, and like, the emphasis being on sexual factors in the mind and in the control of conduct, personality development, and other psychological matters.

Today, psychology seems to be functionalist and behavioral in its orientation; i.e., it seeks to understand mind through the study of behavior by a variety of methods. In its objectivity, psychology shows the influence of operationism, a view that a concept means nothing more than the procedures we employ when we use or measure it. Some of these methods are listed in the paragraphs which follow.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Psychology as a distinct field of study has had a rather long history that goes back thousands of years.

______ 2. Psychology today is closely linked with philosophy and theology and is concerned with problems of the mind and soul.

______ 3. Current psychologists feel that the content of the mind (ideas or thoughts) is a combination of innate knowledge (knowledge we are born with) and experience.

______ 4. Today, psychology seems to be functionalist and behavioral in its orientation; i.e., it seeks to understand the mind through the study of behavior by a variety of methods.

Now turn to Answer frame 1^1 on page 4 to check your responses.

FRAME 2^1

PSYCHOLOGICAL EXPERIMENTATION

As a science, psychology attempts to test its ideas and theories by making observations under explicitly described conditions. If the conditions are stated explicitly, then it is possible for others to make similar observations and thus to verify or fail to verify the findings of the first investigation. It is a hallmark of scientific endeavor that the procedures used in an investigation be public; in principle, then, anyone with sufficient technical skills and facilities can repeat the investigation. When a study is repeated and its results are confirmed, confidence that the results are real ones is increased. Failure to confirm the original findings, however, especially if it occurs several times, is a reason for doubting the original evidence. A science is based on *verified evidence* and does not rely, at least in any obvious sense, on opinion, belief, or judgment undocumented by satisfactorily verified observation.

A major technique for obtaining evidence and for evaluating hypotheses is the *experiment.* Psychology uses experiments wherever possible. In an experiment one looks at a performance on some variable as a result of changes in other variables, with everything else (other possible variables) held constant. Thus, one might wish to determine how memory for a story varies with the speed of reading it. A measure of memory (the dependent variable) would then be taken following presentation of the story at each of several speeds (independent variable). Other variables would be held constant: for example, time of day, extraneous noises, lighting, and so on. There are many complexities in the design and conduct of experiments, but the simple example just given contains the essentials.

However, experimentation involves some problems. For one thing, experiments are carried out under artificial conditions, a necessity if we are to have satisfactory control over variables. For another, many variables are too potent or too damaging to be studied with human subjects. For example, we may wish to know the importance of one part of the brain in learning. The obvious manipulation is to extirpate surgically the part in question. But few experimenters would be willing to do this operation on healthy human beings, even if the latter were willing. So resort is made to studies of animals, on the one hand, or to studies of human patients parts of whose brains have been damaged in accidents or in whom parts of the brain must be extirpated because of tumors or epilepsy. With patients, *the clinical method* may be used.

Clinical procedures involve essentially two techniques. One is *assessment,* the other *treatment.* In assessment, information is gathered by *interviews* and *tests.* Interviews involve talking to the patient, members of his family, or other knowledgeable people in an effort to ascertain information concerning the life history, the kinds of problems the patient has, and the circumstances under which they manifest themselves. Test techniques are standardized methods for assessing abilities and personality characteristics. In a brain-damaged patient, for instance, tests used would be designed to evaluate memory, language, and thinking abilities. Treatment procedures are, of course, attempts to remedy the difficulties the patient is having and vary with these problems. For example, they might be very different for a brain disorder and a psychological disorder. Sometimes treatment procedures are used experimentally, usual-

Answer frame 1¹

1. False. Some feel psychology as a distinct field started with Gustav Fechner in 1861. Others feel it started in 1879 when Wilhelm Wundt opened a lab in Germany. But, in either case, the history is not a long one.
2. False. Psychology today is a distinct discipline which is more closely allied to the sciences than the humanities. Psychology is no longer concerned with the soul, and its conception of mind differs markedly from that of philosophy.
3. True. Plato felt that knowledge was innately given and will appear if properly drawn out. This concept is called *nativism*. John Locke felt experience was necessary and this concept was called *empiricism*. Current opinion is that there is an interaction of the two concepts.
4. True. John Watson founded behaviorism and argued that even with introspection it is behavior and not the mind that is studied. Wundt and Titchener used introspection, in which an observer attempts to report his experience of stimuli in an analytic way. The functionalists objected to these structuralists and studied how the mind functions in adapting to his environment.

An effort has been made to test the most important concepts in each frame. But this is not necessarily accomplished in each case. Therefore, you should use your performance on the questions answered as an indication of your comprehension of all the material in a particular frame. If you missed any of the above questions, you are advised to return to Frame 1¹ and reread the material. The same procedure should be used throughout this programmed learning aid.

When you are satisfied with your comprehension of Frame 1¹, turn to Frame 2¹ on page 3 and continue reading.

Frame 2¹ continued

ly in the sense of finding out the relative value of procedures.

Tests are also used in nonclinical situations, for both practical purposes, such as industrial personnel selection or for admission to college, and for research purposes. In the latter case, for instance, one might be interested in the growth and decline of ability over the age span and, accordingly, test large numbers of people at each of a range of ages from young to old.

Survey methods are also employed. Such methods provide for systematic observation in nonexperimental, nonclinical situations. For example, a *questionnaire* concerning attitudes toward some governmental policy may be developed, and the questionnaire then is administered by experienced interviewers to a carefully selected sample of, say, the voting age population. Election polls are an example of the use of survey methods.

Field methods are sometimes used, occasionally as a preliminary technique to the use of well-controlled methods in the laboratory and sometimes to obtain information that cannot be gathered in any other way. In the latter case, for example, we may wish to know how elephants spend their time in the wild. To find out, the observations, made as systematically and carefully as possible, must be carried out in the natural setting.

These, then, are the major techniques psychologists have for obtaining information pertinent to their subject matter. In all, every attempt is made to avoid biases and peculiarities of sampling and to describe the procedures employed so explicitly that others can in principle repeat the study.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. As a science, psychology attempts to test its ideas and theories by making observations under explicitly described conditions.

_______ 2. In an experiment, one looks at the performance of some variable as a result of changes in other variables, with everything else (other possible variables) held constant.

_______ 3. Human experimentation may be successfully used in almost any circumstance to understand behavior.

_______ 4. Clinical procedures involve two techniques: assessment and treatment.

Now turn to Answer frame 2^1 on page 6 to check your answers.

FRAME 3^1

TYPES OF PSYCHOLOGISTS

There are approximately 30,000 members of the *American Psychological Association,* the major national organization of psychologists in the United States. Where are they employed and what do they do? About a quarter teach in universities and colleges. A good many, approximately a fifth, do administrative work—in colleges, universities, government agencies, and a variety of other organizations. Many do clinical work in hospitals, clinics, and in private practice (perhaps a third). The rest are distributed among a variety of work situations—industrial consulting, full-time basic and applied research, and miscellaneous occupational settings.

What they do, of course, relates to where they are employed, and many will do more than one thing. Some will teach and also administer a department or a college. Others will teach and also do counseling or clinical work. All may do research. To characterize what psychologists do it is easiest to describe the major subspecialties, recognizing that many individuals will combine two or more of them.

Clinical psychologists are trained in psychology, not psychiatry, and it is worth pointing out that psychiatry is a medical specialty and that psychiatrists are medical doctors. Most psychoanalysts are psychiatrists, although there are some psychoanalysts who are not medical doctors. The clinical psychologist participates in diagnostic work through the use of tests of ability and personality and through interviewing and he is often involved in psychological treatment; i.e., psychotherapy and counseling. He does not (unless he is a medical doctor) use drugs or surgical procedures in his treatment activities. In recent years, community mental health centers have involved the clinical psychologist in the development and use of community resources in the treatment and care of the mentally ill and emotionally disturbed person.

Counseling and *school psychologists* work often with clinical methods. However, the counseling psychologist is chiefly concerned with people whose problems are less severe than are those of the people with whom clinical psychologists work, and he may devote some of his time to assisting with educational and vocational choice and other problems. The school psychologist may discharge any or all of the functions of the clinician or the counselor but usually in the public or private school setting.

The bulk of *experimental psychologists,* who study such matters as memory, learning, perception, motivation, sensory processes, and the physiological bases of behavior are typically teachers in universities or colleges. Their research and teaching are directed to the study of basic principles of behavior, rather than to applications which are more the province of the clinical, counseling, school, and industrial psychologists. The last are employed in industry or government (if they do not teach) and are concerned with such problems as employee selection, training, motivation, and morale. Some of them are engineering psychologists, interested in the design of equipment in such a way that human beings may use it effectively.

There are also psychologists who are classified according to their interest areas and who may use

Answer frame 2^1

1. True. If experimental conditions are stated explicitly, it is possible for others to make similar observations to test the findings of previous investigations.
2. True. The variable being studied is called the dependent variable and the variables which cause changes in the dependent variable are called independent variables. All other variables are held constant.
3. False. Experimentation involves artificial conditions which are difficult to create and many variables are too dangerous to explore using humans. Therefore, animals are often used in place of humans, and clinical techniques rather than experiments are often used with patients.
4. True. In assessment, information is gathered by interviews and tests. Treatment procedures attempt to remedy the difficulties the patient is having.

If you missed any of the above, you should reread Frame 2^1 before turning to Frame 3^1 on page 5.

Frame 3^1 continued

experimental as well as other techniques. Among these are *social psychologists* who study psychological aspects of attitudes, beliefs and group behavior, *developmental psychologists* who work on psychological processes through the age span, *personality psychologists* whose interests lie in motivational and related variables in normal people, *psychometric psychologists* who develop and study testing and the theory of tests, and *comparative psychologists* whose interests lie in the study of animals in relation to evolutionary status, in much the same way as do the ethologists who by training tend to be zoologists.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Most psychologists do clinical work in hospitals, clinics, or in private practice.

______ 2. Clinical psychologists are trained in psychiatry and usually use drugs or surgical procedures in treating patients.

______ 3. The bulk of *experimental psychologists,* who study such matters as memory, learning, perception, and motivation are typically teachers in universities or colleges.

______ 4. Many psychologists are classified according to their interest area rather than whether they are clinical or experimental.

Now turn to Answer frame 3^1 on page 8 to check your answers.

chapter 2

THE BIOLOGICAL BASIS: INTEGRATIVE MECHANISMS

FRAME 1[2]

What men and other animals do and can do depends, obviously, on their bodies and their bodily properties. Behavior is the result, largely, of action of the muscles in moving the rigid bones of the skeleton in their joints. Muscles do not always move bones (e.g., the eye muscles, muscles in the viscera, and the speech muscles), and there are of course, glands, whose function is secretory. But much overt behavior does involve movement of the skeleton, and it is important to recognize that most movements involve many muscles acting together or in sequence. To achieve such coordination the body has *integrative mechanisms*. There are two main systems of integration, the *nervous system* and the *bloodstream*.

One example of muscular coordination is afforded by the principle of "reciprocal innervation." For instance, the biceps muscle of the arm acts to bend the elbow, whereas the triceps muscle straightens the arm at the elbow. The two muscles are antagonists and, in free movement, the contraction of one is accompanied by the relaxation of the other, a coordination made possible reflexly in the nervous system. We can in this case, of course, contract both muscles together, producing no movement but placing both muscles in tension, as in isometric exercises.

The nervous system is the major integrating mechanism, controlling both the muscles and the circulation of the blood as well as the secretion of various glands. Hence, our major concern in this chapter is with the nervous system.

In man, the nervous system is the result of evolution from much simpler systems. The amoeba, a one-celled organism, has no nervous system, and the first real nervous system, a *nerve net*, appears in such animals as the sea anenome and the jellyfish *(coelenterata)*. In such a nervous system, nerve impulses can travel in either direction and there is little or no specialization of function. The course of evolution of the nervous system in animals brings many changes, in size, specialization, and integration.

In higher animals, transmission of nerve impulses is typically one-way. A description of the units of such nervous systems will indicate how this comes about.

The basic unit is a *neuron*, which is a cell with three major parts. The three parts are the *cell body* (which contains the nucleus), the *dendrites* (short fibers projecting from the cell body), and an *axon* (which is a fiber, sometimes quite long, emerging from one side of the cell body). There are many kinds of neurons, varying in the length of their dendrites and axons, but all have these three parts. The dendrites respond to stimulation and carry a nerve impulse toward the cell body; the axon carries the impulse away from the cell body.

Neurons are separated from one another by *synapses*. A synapse is a place where an axon may terminate, adjacent to but not connected with the dendrites of another cell. Conduction across the synapse occurs when certain chemicals, such as acetylcholine, are released from the synaptic vesicles of the axon into the synaptic gap. The effect of the chemical transmitter may be to fire the next cell, but it may not. One reason for not firing it is that there may be an inhibitory effect of the chemical transmitter. Another reason is that, even with excitatory

Answer frame 3^1

1. False. Only about one third do clinical work. About one fourth teach in colleges and universities. Another one fifth do administrative work. Many other jobs are available to trained psychologists.
2. False. Clinical psychologists are trained in psychology, not psychiatry (a medical specialty), and do not (unless they are medical doctors) use drugs or surgery. They do participate in diagnostic work and are often involved in psychological treatment.
3. True. Their research and teaching are directed to the study of basic principles of behavior, rather than to applications, which are the province of clinical, counseling, school, and industrial psychologists.
4. True. *Social* psychologists study psychological aspects of attitudes, beliefs, and group behavior and *developmental* psychologists work on psychological processes through the age span. Other psychologists are known as personality psychologists, psychometric psychologists, and comparative psychologists.

If you missed any of the above, you should restudy Frame 3^1 before beginning Chapter 2 on page 7.

Frame 1^2 continued

effects, there is a threshold for excitation that must be reached before the next neuron will fire. Once this threshold is exceeded, as by, for example, the release of chemical transmitter from the vesicles of several axons, the cell responds in an *all-or-none manner;* i.e., it fires to its maximal extent (or not at all). The nerve impulse itself is an electrochemical event involving a flow of sodium ions into the cell and a flow of potassium ions outward. The speed of the nerve impulse, which can be recorded as an electrical change, varies from as slow as 2 miles an hour (for small diameter fibers) to as fast as 200 miles an hour (for large diameter fibers). It should be remembered that a *nerve* is not a single neuron but rather a bundle of axons or elongated dendrites belonging to many neurons.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. The nervous system is the major integrating mechanism of the body since it controls the muscles and the circulation of the blood (as well as the secretion of various glands).

______ 2. In higher animals, transmission of nerve impulses is usually two-way.

______ 3. The basic unit of the nervous system is a neuron, which has three major parts.

______ 4. A nerve is not a single neuron, but rather a bundle of axons or elongated dendrites belonging to many neurons.

Now turn to Answer frame 1^2 on page 10 to check your responses.

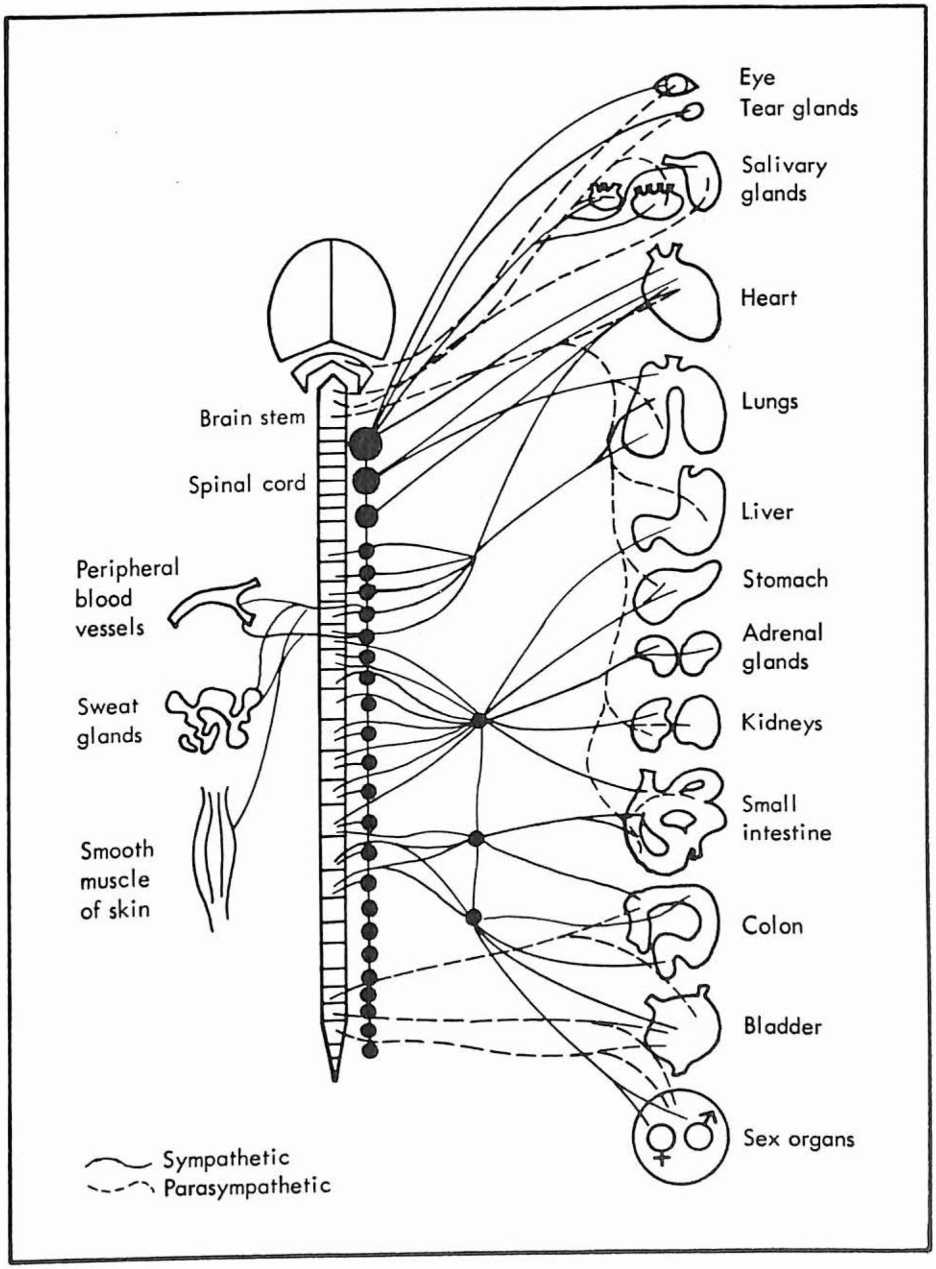
FRAME 2^2

MAN'S NERVOUS SYSTEM

A primitive vertebrate, like the dogfish, has a brain, but a major difference between this brain and that of man lies in the enormous development, in the latter, of the *cerebral cortex.* It is the cortex which confers on man many of the abilities which he possesses that other animals do not. But the cortex is not the only feature of man's nervous system. For convenience, we can divide the discussion of the nervous system into three parts: the *central nervous system,* including the brain, the *peripheral nervous system,* and the *autonomic nervous system.*

The peripheral nervous system lies outside the spinal cord and the brain and consists essentially of neurons which synapse in sense receptors or muscles. Nerves which carry impulses from sense receptors to the spinal cord are called *afferent* fibers and those which carry impulses away from the spinal cord to glands or muscles (effectors) are called *efferent* fibers. Efferent nerves carry not only fibers impulses

FIGURE 2-1



Source: C. T. Morgan and R. A. King, *Introduction to Psychology* (4th ed.; New York: McGraw-Hill Book Co., 1971), p. 230. Used with permission of McGraw-Hill Book Co.

Answer frame 1^2

1. True. There are two main systems of integration, the nervous system and the bloodstream, but the nervous system is the major integrating system because it controls the muscles and the circulation of blood.
2. False. Higher animals have a one-way transmission of nerve impulses typically, but animals like the jellyfish have a nerve net where nerve impulses travel in either direction and there is little or no specialization of function.
3. True. This is the basic unit of the nervous system and it does have three major parts.
4. True. A nerve consists of more than one neuron.

If you missed any of the above, you should restudy Frame 1^2 before turning to Frame 2^2 on page 8.

Frame 2^2 continued

from which will activate an effector but also fibers whose impulses modulate the amount of sensory input that will be transmitted from receptors in effectors such as the muscles.

The peripheral nervous system, described above, includes efferent nerves which go to the *skeletal* or *striated muscles.* The autonomic nervous system contains efferent fibers as well, but these fibers innervate *smooth muscles and glands,* those involved especially with vegetative and automatic processes of the body. The autonomic nervous system has two divisions, the *sympathetic* and *parasympathetic* nervous systems. These divisions connect to the central nervous system (the spinal cord and brain stem) via ganglia (collections of cell bodies) which are external to the central nervous system, the ganglia of the sympathetic system being arranged in parallel with the spinal cord (see Figure 2-1) and those of the parasympathetic system being near the organs it innervates. The latter system acts in a piecemeal way, whereas the sympathetic system acts as a unit.

The sympathetic division innervates such structures as the salivary glands, heart, lungs, liver, stomach, pancreas, kidneys, intestines, adrenals, the bladder, colon, rectum, and the genitals, as well as blood vessels, sweat glands, and hair follicles. In emotional excitement its action dilates blood vessels in the heart but constricts those of the skin and digestive organs. It stimulates perspiration and the secretion of adrenaline or epinephrine. The parasympathetic division innervates many of the same organs, and its action on them is often but not always antagonistic to that of the sympathetic division. For example, its effect on the pupils of the eye is constriction, whereas that of the sympathetic system is dilation. In general, the parasympathetic division is in control during the quiescent periods of an organism, contributing to the processes that maintain and conserve the resources of the body. Active in emotion, for example, the sympathetic division prepares the body for high levels of energy expenditure.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. A primitive vertebrate, like the dogfish, has a brain very much like that of man.

_______ 2. The peripheral nervous system lies outside the spinal cord and the brain and consists essentially of neurons which synapse in sense receptors or muscles.

_______ 3. The autonomic nervous system includes efferent nerves which go to the skeletal or striated muscles.

_______ 4. The autonomic nervous system has two divisions, the sympathetic and parasympathetic nervous systems.

Now turn to Answer frame 2^2 on page 12 to check your answers.

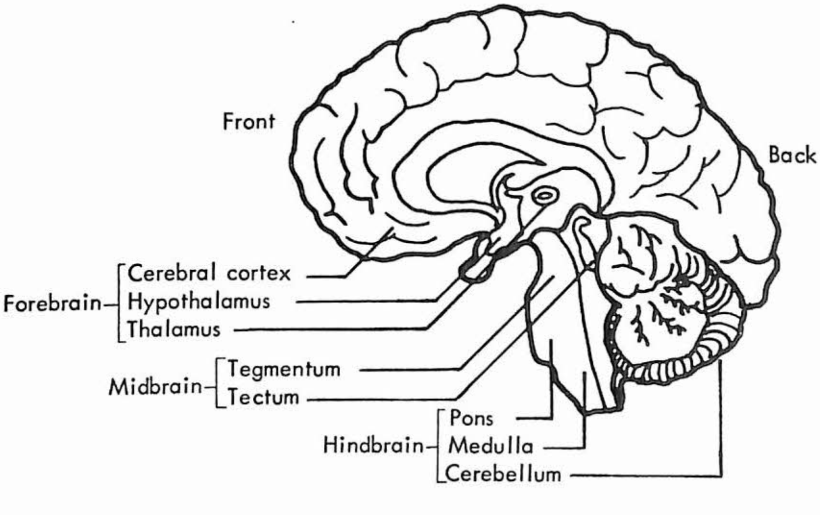
FRAME 3[2]

The spinal cord and brain. The central nervous system consists of the *spinal cord* and the *brain*. Many nerves conduct to and from the cord. Typically, the cord sends impulses upward and there are probably very few, if any, reactions in the human that are mediated in the spinal cord alone. Such mediation is involved in simple reflexes, in which the afferent impulses are transmitted to the efferent fibers by means of short neurons lying in the cord. Such transmissions may, of course, be affected by activity at other levels of the cord or in the brain.

The brain (see Figure 2-2) can be divided into three sections—the *hindbrain*, the *midbrain*, and the *forebrain*. The first includes the *medulla oblongata* which contains collections of cells (centers) that regulate breathing and heart rate and which transmit impulses upward, the *cerebellum*, one center involved in motor coordination, and the *pons* which contains nuclei and connects the two sides of the cerebellum. The *midbrain* contains a number of fiber tracts as well as centers and nuclei. The *forebrain*, consisting of the *cerebrum* and its covering, the *cerebral cortex*, the *thalamus* and the *limbic system* (see Figure 2-3). The thalamus is a relay station and contains various nuclei. The limbic system contains a number of structures, such as the *amygdala*, the *hippocampus*, and part of the *hypothalamus*, which are involved in emotional and motivated behavior. Not in the forebrain, but closely related in function as a relay station, is *the reticular system* in the brainstem which is composed of a dense bundle of fibers which project, as does the thalamus, to the brain. It receives impulses from sensory nerves via collateral fibers and functions to stimulate the cortex over much of its area.

The cerebral cortex, a layer of gray matter over the white cells of the cerebrum, is most fully developed in man and is divided, in most cases by fissures, into several areas or *lobes* (see Figure 2-4). Some of the functions of the cerebral cortex are located in relatively specific areas, as follows: the *motor area*, which controls movements of the body, lies just in front of the central fissure, in the frontal lobe; the *parietal lobe*, just on the other side of the central fissure, is involved in the sensory experience from the body; at the rear of the brain, in the *occipital lobe* the sense of vision is importantly mediated; below the lateral fissure, in the *temporal lobes* are

FIGURE 2-2



Source: C. T. Morgan and R. A. King, *Introduction to Psychology* (4th ed.; New York: McGraw-Hill Book Co., 1971), p. 597. Used with permission of McGraw-Hill Book Co.

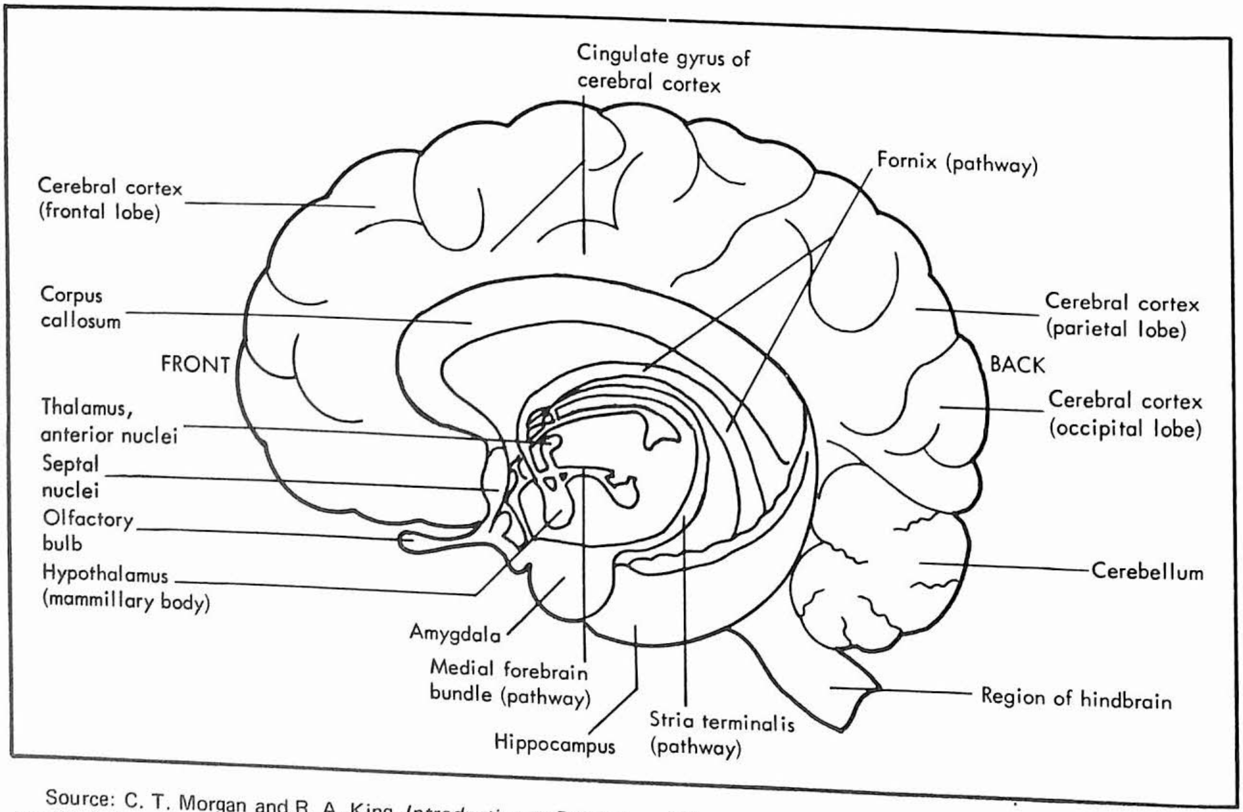
Answer frame 2^2

1. False. The major difference between a primitive vertebrate's brain and a man's brain is that men have an enormous cerebral cortex which gives man many abilities which other animals do not possess.
2. True. Nerves which carry impulses from sense receptors *to* the spinal cord are called *a*fferent fibers and those which carry impulses *away* from the spinal cord to glands or muscles are called *e*fferent fibers.
3. False. The autonomic nervous system contains efferent fibers, but these fibers innervate smooth muscles and glands, those involved especially with vegetative and automatic processes.
4. True. The sympathetic nervous system innervates such structures as the salivary glands, heart, lung, liver, stomach, intestines, as well as blood vessels, sweat glands, and hair follicles. The parasympathetic system innervates many of the same organs, and its action on them is often antagonistic to that of the sympathetic systems.

If you missed any of the above, you should review Frame 2^2 before turning to Frame 3^2 on page 11.

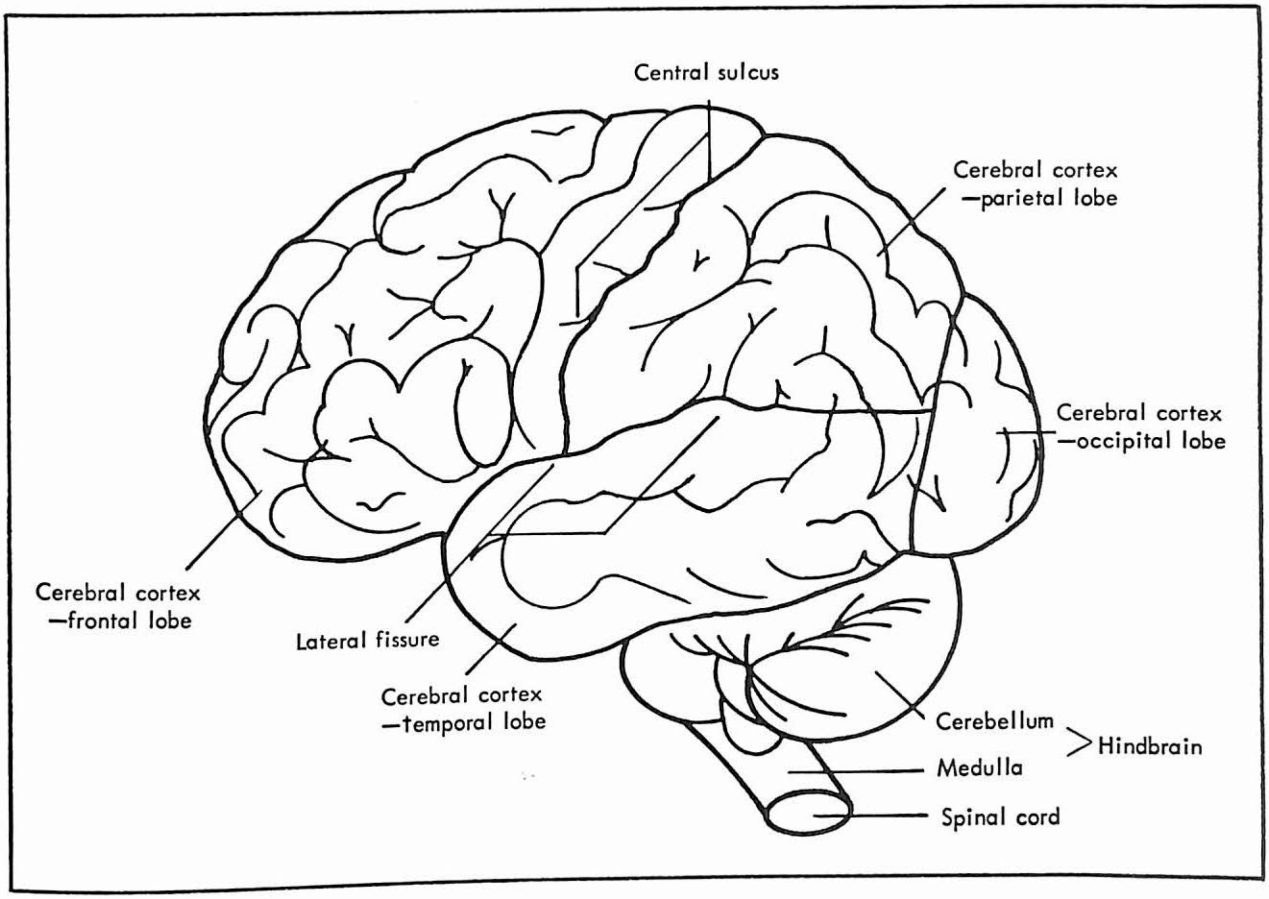
Frame 3^2 continued

FIGURE 2-3


Cingulate gyrus of cerebral cortex
Fornix (pathway)
Cerebral cortex (frontal lobe)
Corpus callosum
FRONT
Cerebral cortex (parietal lobe)
BACK
Cerebral cortex (occipital lobe)
Thalamus, anterior nuclei
Septal nuclei
Olfactory bulb
Hypothalamus (mammillary body)
Cerebellum
Amygdala
Medial forebrain bundle (pathway)
Hippocampus
Stria terminalis (pathway)
Region of hindbrain

Source: C. T. Morgan and R. A. King, *Introduction to Psychology* (4th ed.; New York: McGraw-Hill Book Co., 1971), p. 601. Modified from P. D. MacLean, "Psychosomatic Disease and the 'Visceral Brain,'" *Psychosomatic Medicine,* 1949, Vol. 11.

FIGURE 2-4



Source: C. T. Morgan and R. A. King, *Introduction to Psychology* (4th ed.; New York: McGraw-Hill Book Co., 1971), p. 598. Used with permission of McGraw-Hill Book Co.

regions involved in auditory experience; in the temporal lobe but also in the frontal lobe are areas involved in speech. Many other areas of the cortex are not so specific in function as those just mentioned but are generally viewed as *"association" areas;* i.e., they are involved in such integrative activities as thought and memory and are involved in the elaboration of information coming from the senses.

Our knowledge of the brain and its functions comes from several methods. One of them is *destruction of nerves* or *parts of the brain,* which often helps to clarify anatomical relations as well as to identify functions. Another is to *stimulate electrically* places in the brain, large or small, to determine the effects such stimulation has. A third is to *measure electrical activity* of the brain as a whole or in its parts and attempt to correlate such activity with ongoing psychological processes. One may also stimulate a receptor, say the eye, and record electrically the effects such stimulation has. It is obvious that much can be learned about brain-behavior relations in these ways, but that none of these techniques is simple or easy to apply.

We mentioned integration by the bloodstream earlier in this chapter. The circulation of the blood accomplishes the distribution of chemicals through the body, and changes in its own constitution (as a result of thirst, for example) may set off actions in widely separated bodily structures of a restorative or regulatory character. The *endocrine glands,* which are ductless, secrete hormones directly into the bloodstream which can then distribute them to other structures in the body. Among the major endocrine glands, the *adrenals*, the *sex glands*, and the *pituitary gland* secrete hormones which are importantly involved in psychological phenomena. We shall mention, later, the role of the adrenals and the sex glands and note here that the pituitary is often referred to as "a master gland," involved in regulating the other glands in concert with neural influences especially from the hypothalamus.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. The central nervous system consists of the spinal cord and the brain.
_______ 2. The midbrain regulates breathing and heart rate.
_______ 3. The forebrain consists of the cerebrum and its covering, the cerebral cortex, the thalamus and the limbic system.
_______ 4. The cerebral cortex (gray matter) is most fully developed in man.

Now turn to Answer frame 3^2 on page 16 to check your answers.

chapter 3

INHERITANCE, MATURATION, AND STIMULATION IN DEVELOPMENT

FRAME 1^3

In the last chapter, we sketched the major integrating mechanisms of the body and some of their functions. It is perfectly obvious that the structures involved are part of man's constitution and that the differences in these structures among species, to which we alluded briefly, represent constitutional, i.e., *inherited*, variations among those species. Inheritance, then, plays a primary role in species differences and in the constitution of the bodily structures of each species. It is also obvious that behavioral differences are associated with structural differences: jellyfish can't talk, having no structures with which to do so, whereas man can.

The points just made are obvious but illustrate in a gross way a question concerning a finer point: we all know that people differ in ability, emotionality, and in a host of other ways. To what extent are these differences due to inherited, structural characteristics or, alternatively, to what extent are they due to experience? Or, are both heredity and experience involved? In this chapter, we review some areas in which these questions have been raised and some answers obtained. First, however, we examine the nature of inheritance, of congenital factors, and of maturation, and the role of stimulation in development.

HEREDITY

One's inheritance is transmitted by means of *chromosomes*. Each human body cell contains 46 of these structures, in 23 pairs, but the cells which we receive from our parents, the *sperm* from the male and the *ovum* from the female, each contain only 23 chromosomes. It is the union of these parental cells at conception that provides us with 46 chromosomes, and it is obvious that half of our inherited material comes from each parent. The number of combinations of chromosomes that can occur over a number of conceptions by the same parents is enormous, so that no two individuals, with one exception, have identical heredities. The exception is the case of *identical twins,* both of whom develop from the same fertilized ovum. *Fraternal twins,* however, developing from two ova fertilized simultaneously by two sperm, have no more similarity in their heredities than do ordinary brothers and sisters (siblings). Children of the same parents do, of course, have more similar heredities than do children of different parents.

Chromosomes actually are carriers of the units of genetic material, called *genes,* probably related to DNA (deoxyribonucleic acid). Most inherited characteristics are determined by combinations of genes, rather than by single genes, and the mechanisms of inheritance are further complicated by the fact that some genes are *dominant* over others, called *recessive* genes. The genic combination for brown eye color, for example, is dominant over that for blue eye color. This means that if one has the genes for both brown and blue eye color his eyes will be brown. However, if in mating, the gene for blue eye color happens to be paired with another gene for blue eye color from the other parent (whichever his or her eye color) the offspring can be blue-eyed. Hence the externally observable characteristic (the *phenotype,* i.e., eye color) is not, in a given generation, a clue to the underlying genic structure (the *genotype*).

One's inheritance is determined at conception, but it must not be thought that his characteristics at birth are due solely to inheritance. There is, of course, the period from conception to birth, during which events can have an effect on the characteristics displayed at birth. Such characteristics are referred to as *congenital* to differentiate them from those that are inherited. There is a little evidence that the fetus can learn, but there is no evidence to indicate that it can or does learn very much. More important influences in the prenatal period are those mediated by the *exchange* across membranes of materials between the bloodstreams of the mother and the infant. (The bloodstreams do not mix.) These influences may arise through malnutrition, diabetes, and syphilis in the mother and through her ingestion of drugs like thalidomide or large amounts of barbiturates. We know (see below) that emotional experiences are accompanied by many physiological changes, including secretion of adrenalin and noradrenalin, and it is a reasonable hypothesis that prolonged or chronic emotional disturbances such as anxiety or tension in the mother may have effects on the unborn child. There is a little evidence that women who are highly anxious during pregnancy may have children who cry a lot, but the evidence is not entirely clear or its interpretation certain. Fear or anxiety has been induced by experimental means in female rats both before and during pregnancy. On tests believed to measure emotionality in rats, the offspring were found to be more emotional than animals without anxious mothers at both one month and four to five months after birth.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. Inheritance plays a primary role in species differences and in the constitution of the bodily structures of various species.

_______ 2. One's inheritance is transmitted by means of chromosomes.

_______ 3. Most inherited characteristics are determined by single genes which are carried by the chromosomes.

_______ 4. The externally observable characteristics of a person such as eye color are a good clue to his underlying genic structure.

Now turn to Answer frame 1^3 on page 16 to check your responses.

Answer frame 3^2

1. True. There are probably very few, if any, reactions in the human that are mediated in the spinal cord alone. The central nervous system is made up of the spinal cord *and* the brain.
2. False. The medulla oblongata is part of the hindbrain and regulates breathing and heart rate. The cerebellum is another part which is involved in motor coordination. The pons contains nuclei and connects the two sides of the cerebellum.
3. True. The limbic system contains a number of structures, such as amygdala, the hippocampus, and part of the hypothalamus, which are involved in emotional and motivated behavior.
4. True. Some of the functions of the cerebral cortex areas are control of the movement of the body (motor area); sensory reception from the body (parietal lobe); vision mediation (occipital lobe); auditory experience (temporal lobes); and speech (frontal lobe).

If you missed any of the above, you should restudy Frame 3^2 before beginning Chapter 3 on page 14.

Answer frame 1^3

1. True. Behavioral differences are associated with structural differences, and inheritance plays a primary role in structural differences.
2. True. Each human cell contains 46 chromosomes in 23 pairs, but male sperm and the female ovum contain only 23 chromosomes each. It is the union of these parental cells that provides us with 46 chromosomes.
3. False. Most characteristics are determined by combinations of genes.
4. False. Some genes are dominant and some recessive. The genic combination for brown eye color is dominant over that for blue eyes. A person with brown eyes, therefore, could have parents who both have brown eyes, or one may have blue eyes. One cannot tell the genic structure, therefore, by looking at eye color.

If you missed any of the above, you should restudy Frame 1^3 before beginning Frame 2^3 below.

FRAME 2^3

MATURATION

The inherited characteristics of an individual are not all manifest at birth. This is because some of them depend for their emergence on *growth* and *development.* Thus, the secondary sex characteristics (hair distribution, voice changes, and so on) in boys and girls do not appear until the development of sexual maturity at puberty. Yet, there is no doubt that the structural differences associated with gender are inherited. We speak of the emergence of inherited characteristics some time after birth as arising from *maturation.* In the case of such characteristics, of course, one can always raise the question whether experience or training is a factor. This question arises naturally where behavior is concerned, and it has been studied in such performances as walking, climbing, and talking, among others, in the human being.

Whether behavior patterns, called *species-specific reactions,* occur in animals on the basis of heredity and maturation can be studied under careful experimental control with some animals, but not easily in human beings. For example, swimming appears at the normal stage of development in *tadpoles,* even when the animals are kept suspended in a chloretone solution during a substantial part of their development. This drug prevents activity and thus practice although it permits normal growth and development. Certain fish, specifically the *three-spined stickleback,* manifest a complex innately determined behavior pattern as follows. At mating time, the male fish leaves the company of the school and enters a territory from which he will eject any intruders. He builds a nest on the floor of the stream, by digging a shallow depression in the sand and covering it over with weeds, boring a tunnel under the weeds by using his snout. At this point, his color changes, his belly becoming red. He then courts females, "courting" those whose swollen underbellies are engorged with eggs. His initial approach is a zigzag swimming pattern, sometimes called a "dance." If a female responds, the male leads her to the nest, which ultimately she enters. The male prods her tail area and she lays eggs. He then fertilizes them and remains in the area, providing for the oxygenation of the fertilized eggs by fanning them with his gills. This whole complex sequence is unlearned and its components seem to depend for their occurrence on the stimuli provided by the partner and the eggs. The initiation of the sequence, of course, depends on a state of *hormonal readiness,* as the breeding behavior of the stickleback is seasonal.

Maturational development in the human shows certain general patterns, reflected in the development of specific performances such as *walking.* These patterns include the following. One is the *cephalocaudal sequence,* meaning that the head end of the organism is much better developed at birth and early life than the tail end. It also functions first, in the sense that the infant can raise his head and control its movements before he can do so with the shoulders and more caudal parts of the body. Similarly, growth occurs in the trunk and shoulders earlier than in the legs and arms, a pattern referred to as *proximal-distal.* The infant has control of the movements of his trunk before he does of his legs, in correspondence to the growth pattern. A third general pattern is *differentiation;* the infant's early responses tend to be widespread or "all over"—he thrashes. Later, he will respond in a limited way; i.e., more precisely. Ultimately, of course, he can put these more specific responses together into well-integrated patterns.

The emergence of walking in the child follows a regular pattern, emerging even though the child spends a good deal of his young life strapped to a cradleboard, as is the practice among some Indian and Eskimo groups. The sequence goes like this: First, lying on his stomach, the child can raise his chin, then his head. Next, he can sit when propped up, followed by being able to sit alone. Creeping appears, and then walking with support from an object like a table. Walking while being led follows next, and then standing alone. The first steps follow, on the average at a little over a year. This sequence is followed with fair regularity by all children, although the age at which any of the components of the sequence appears varies from child to child.

In *language,* too, there seems to be a developmental sequence. Early there are *infant sounds,* followed by *babbling,* both of which appear in children who are deaf and thus do not depend on auditory stimulation. The first word appears shortly after the first year, and there is an increase in the number of the child's words over the next weeks. Two-word utterances appear next and then utterances of three words. These patterns are similar across cultures, and there is some evidence that early syntactic (grammatical) patterns are similar, even among children brought up in diverse language communities. However, the specific language to which he is exposed determines the language the child will ultimately learn, of course. There is an opinion among students of language development (developmental psycholinguists) that language is a characteristic largely specific to the human being and that innate factors are of the first importance in its development.

Some attempts have been made to determine whether extra practice can accelerate the development of some skills, like climbing. In the major experiments of this kind, twins have been used, one being selected for special training, the other being left alone to develop normally. It is found that the extra training does accelerate performance. However, if at some point the untrained twin is given training, he is found to progress much more rapidly than the twin whose training started early. This finding suggests the importance of *maturation* on the effects of practice. No one, however, has continued the training of the first twin indefinitely, while letting the other one develop normally. There is reason to believe that early training can be beneficial, although it is unlikely to upset developmental sequences.

There is, of course, the opposite possibility: the effects of *deprivation of training* upon development. Little work has been reported on this alternative, but one study of orphanage children in Iran showed a retardation in the age of walking in children placed in an overcrowded institution who received little individual care or handling. For example, they were left lying on their backs much of the time, rather than being placed on their stomachs some of the time. The investigator thinks that experience in the latter *(prone)* position may be necessary to the normal development of walking.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. The secondary sex characteristics (hair distribution, voice changes, and so on) which do not appear until sexual maturity are not associated with heredity.

______ 2. Maturational development in humans shows certain general patterns, reflected in the development of specific performances such as walking.

______ 3. Studies with animals indicate that activities such as swimming, mating, and establishing territories are all learned through watching the practice of others.

______ 4. Maturation plays an important role in the effectiveness of training on infants.

Now turn to Answer frame 2^3 on page 20 to check your answers.

FRAME 3^3

STIMULATION

Stimulation has also been studied as a factor in development. *Deprivation of stimulation* has been arranged experimentally in animals, by raising them in impoverished environments, in darkness, or with blindfolds. There are reports of deficits in the sensory and behavioral functioning and in the ability to learn in animals raised under such conditions. Similarly, there are defects in visual performance in humans whose sight is restored after they were blind from birth. All sorts of abnormalities are reported in children subjected to the unstimulating environments of some institutions, although the reasons for the abnormalities cannot be delineated with precision.

Enriching environments is another way of examining the problem, and, with animals, one can provide a situation in which the living space contains all sorts of stimulation, including visual patterns on the walls and "playthings" and pieces of apparatus (e.g., wheels, shelves, ladders) in the space the animal occupies. Behavioral performances seem to be improved by substantial experience with enriched environments, as animals subjected to them learn and discriminate more rapidly than animals reared normally. There is evidence, too, that a stimulating environment can improve the abilities of children previously kept in the crowded circumstances of an orphanage. However, such stimulation must be extensive and long-term, as short periods of enrichment, while they may produce temporary gains, seldom engender permanent changes.

INHERITANCE AND HUMAN TRAITS

A question of great interest in conjunction with inheritance is the extent to which human traits, such as intelligence, emotionality, and mental illness, are influenced by heredity. Likewise, there is interest in whether sex and race are associated with hereditary differences in characteristics like these.

These questions are very difficult to answer satisfactorily, because environments may differ as well as heredity. Animal studies can help and, of course, one can compare identical twins with fraternal twins and with children of other degrees of kinship in terms of relationships found.

Intelligence. Breeding studies with rats have shown that maze learning is inherited, and one assumes that maze learning in this animal is a measure of intelligence. The procedure here is to test a group of animals in this task and then to mate together pairs that did poorly and pairs that did well. Repeating this process over nine generations, one study developed two sets of animals, almost completely separated from one another in ability to learn the maze. Just what are the inherited factors of critical importance, however, depends on what factors are important to maze learning, and there is some reason to believe that emotional and motivational differences are involved in the distinction between *maze bright* and *maze dull* rats. They did not differ consistently on other tasks of learning.

With humans, the intelligence of children and their parents is related and that of foster children is more closely related to that of their natural parents than it is to that of their foster parents. These facts suggest a role for inheritance. Twin studies also support this interpretation. The intelligence of identical twins is more similar than that of fraternal twins, who in turn are more similar than siblings (the latter difference suggesting a role of the more similar environment fraternal twins have as compared to ordinary siblings). Even when identical twins are reared apart, their scores on intelligence tests are highly related although less so than when they are raised together. The general conclusion from the various investigations is that a strong role is played by heredity in intelligence, although our earlier discussion of experience, of course, should alert us to the point that heredity is not alone in determining this characteristic.

Emotionality. There is good evidence from breeding studies of animals that the trait of emotionality is heritable. Emotionality was defined as extensive urination and defecation by rats in an open field; i.e. a large enclosure. Highly emotional animals were mated, as were unemotional animals, and selective mating over several generations was arranged. As was the case with maze-bright and maze-dull animals, two strains developed, one highly emotional and the other not. Other animal characteristics such as excitability in dogs seem also to have a heritable component.

Little evidence is available in the human, although in one study identical twins were shown to be more similar in certain physiological reactions (often taken to indicate emotion) than were siblings or unrelated children. All the relationships were low, but they did tend to be higher in the identical twins than in the other children.

Mental illness. We will discuss mental illnesses in a later chapter, but here we mention one of them, which has received a good deal of study from the standpoint of inheritance. It is *schizophrenia,* and again the main data come from studies of its incidence in persons who are familially related. In several studies the question has been asked, "If one identical twin is schizophrenic what is the likelihood that the other one will also be schizophrenic?" The proportions range from 0 in one study to a high of 88 in another; the corresponding percentages for fraternal twins range from 0 to 23 if they are of the same sex and from 0 to 11 for opposite sex pairs. There is a good deal of variability in the proportion obtained in the different studies but the prevailing opinion is that the inheritance of the schizophrenic tendency is indicated by the data. Of course, there are instances in which one identical twin is schizophrenic, the other not. There may have been environmental differences in such instances, although the nature of such differences is uncertain. Perhaps here, as with other characteristics in which inheritance plays an important role, environmental factors interact with the inherited ones to bring out the trait.

Race and sex differences. Intelligence tests given to large numbers of blacks and whites, a procedure followed, for example, in the United States in World War I, yielded averages that differ, the average score for the whites being higher than that for the blacks. However, when the two groups were broken down into groups that came from the North and those that came from the South, the northern blacks were found to obtain higher average scores than southern whites. In all cases, there were many overlapping scores. For example, in the first comparison many blacks scored as well as or better than many whites. Although there is still a good deal of controversy about the meaning of intelligence test score differences for blacks and whites, there is reason to think that the scores are strongly influenced by educational and cultural factors and that the differences may arise on these bases, rather than on genetic grounds.

Similar complications confound the comparison of the sexes on many characteristics, although there is, of course, no question that there are inherited differences in physical characteristics such as height, pelvic structure, and the like. But the sex role training of boys and girls starts very early in most

Answer frame 2^3

1. False. We speak of the emergence of inherited characteristics some time after birth as arising from maturation.
2. True. The emergence of walking in a child follows a regular pattern, emerging even though the child may spend a part of his life strapped to a cradleboard as is the practice among some Indian and Eskimo groups.
3. False. Many animals and fish, such as the three-spined stickleback, swim, mate, establish a territory, and court without learning and these activities must thus be traced to heredity and maturation.
4. True. Extra training may accelerate performance, but training leads to much more rapid progress when the child has matured to the point where he is ready for such activities.

If you missed any of the above, you should reread Frame 2^3 before turning to Frame 3^3 on page 18.

Frame 3^3 continued

cultures, and these environmental differences may be responsible for other differences which are reported. For example, boys are found to be stronger and more aggressive than girls at all ages, whereas girls advance earlier than boys on verbal skills and show a smaller incidence of stuttering and reading disabilities. More males than females are color blind and develop baldness, differences related to their chromosomal constitution. It is probably unwise, however, to make any sweeping statements about sex differences in abilities on the basis of the presently available evidence.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. There is some evidence that the lack of physical stimulation has a negative effect on behavior.
______ 2. With humans, the intelligence of children and their parents is not related.
______ 3. There is good evidence from breeding studies of animals that the trait of emotionality may be inherited.
______ 4. Intelligence tests given to whites and blacks have established definite patterns of superiority and inferiority between races.

Now turn to Answer frame 3^3 on page 22 to check your answers.

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chapter 4

ASPECTS OF PSYCHOLOGICAL DEVELOPMENT

FRAME 1[4]

Given adequate nutrition and stimulation, the healthy baby grows and develops, but psychological studies of children at various ages indicate that the child differs in many ways from the adult. This is to say that the child at no point in development is just "a little adult," differing only quantitatively from the "grown-up" he will become. The period of development is not, despite our emphasis in the last chapter on heredity and maturation, just a period of the unfolding of unborn characteristics. Rather, it is a period also during which the child's behavior is shaped by parents, peers, and the schools to accord with the standards and values of the particular subculture (e.g., social class) into which he has been born. In this chapter, we attempt to display in various psychological functions, how the child differs from the adult, how he changes with age, and the shaping processes which have been suggested as influencing his development to one degree or another.

In the study of development, two concepts have achieved prominence. One is the notion of a *stage of development,* the idea being that there are periods of development which differ from one another and that there is an orderly progression, often age-related, of stages. It is usually believed that a later stage is dependent upon an earlier stage; i.e., that stages cannot be skipped. The orderly development of walking and talking, outlined in the last chapter, illustrates the concept of stages.

The other idea is that of the *critical period.* This idea is that at a developmental period one is usually capable of profiting from certain experiences. After this period, it is much more difficult, if not impossible, to learn from the experiences. Many students of language behavior believe that there is a critical period for this learning, extending from early life to puberty, when the child can learn language, if appropriately stimulated, very easily. Later this facility is lost, and languages are acquired only with the greatest difficulty. The critical period is not necessarily correlated with any one stage of development and the loss after a critical period is passed is irreversible. This irreversibility is not usually suggested for stages.

COGNITIVE DEVELOPMENT

At birth and for a period thereafter, the infant spends a large proportion of his time in sleep and much of his waking time in nursing. However, he has *sensory capabilities,* responding to taste and smell stimuli and to stimuli on the skin—those that produce touch, temperature, and pain. Sensitivity of the skin senses is greatest, at the beginning, on the face. Responses to sounds appear early, and there is evidence that infants at 5 to 10 days of age look longer at relatively complex visual patterns than they do at simple patterns. Thus, infants inspect checkerboardlike patterns longer than single-colored surfaces and look at shapes with 10 turns or angles longer than at simpler shapes, not yet, however, responding as much to even more complex shapes.

Our knowledge of cognitive development comes to a great extent from the work of *Jean Piaget,* a Swiss psychologist, who has postulated several stages in development. The earliest period, from birth to two years, the sensorimotor period, includes the

Answer frame 3³

1. True. There are reports of deficits in the sensory and behavioral functioning and in the ability to learn in animals raised under conditions of darkness or impoverished environment.
2. False. The intelligence of children and their parents is related and that of foster children is more closely related to that of their natural parents than it is to that of their foster parents.
3. True. Highly emotional animals were mated, as were unemotional animals, and selective mating was arranged over time. As with maze-bright and maze-dull animals, two strains developed, one highly emotional and the other not.
4. False. There is a great deal of controversy about the meaning of intelligence test score differences for blacks and whites. There is reason to think that the scores are strongly influenced by educational and cultural factors.

If you missed any of the above, you should restudy Frame 3³ before turning to Chapter 4 on page 21.

Frame 1⁴ continued

differentiation of the youngster from objects in the environment. Important to this development is the motor activity of playing with or manipulating objects. For example, at five months if an object like a ball is hidden from his view, the infant will act as if it no longer exists. A little later, however, he will appear to search for it, indicating that he now knows the ball to be an enduring object. There is next a stage of *pre-operational thought,* in which there are two phases. The notion of *conservation* illustrates the changes here. Conservation appears in the next stage, but its absence characterizes the pre-operational stage. If one has a ball of clay and presses it into a long sausage shape, adults recognize that the *mass* has not changed. Children in the pre-operational stage, however (three to five years), think the longer, sausage-shaped piece contains more clay than the ball. Similarly, the child does not have the concept of conservation of *volume.* Suppose that one has a quantity of a colored fluid in a low, wide jar. Then pour the liquid in the jar into a tall, narrow container. The child will think the latter contains more liquid than the jar. There is a developmental sequence in conservation: the child first achieves conservation of mass, then of weight, and then of volume. Training can have an effect of accelerating the development of conservation, but it does not seem to be very effective as compared with the natural development of this concept.

The stage of pre-operational thought lasts from age two to age seven, although, of course, there are large individual differences. The period of *concrete operations* comes next and endures to age 11. In it, logical operations like arithmetic reversibility, hierarchical classification, and organizing objects into series, as on the basis of size, appear. Finally, there is the period of *formal operations,* in which the individual's thought becomes abstract and highly conceptual. At this point he can test hypotheses.

There is much more to cognitive development than the foregoing account indicates. But enough has been said to illustrate the differences between child and adult and to convey the maturational flavor of this aspect of development.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. A child at a certain point in his development is "just a little adult" and differs only quantitatively from the grown-up he will become.

______ 2. Most psychologists feel that a child may skip one stage in his development without any effect on his later development.

______ 3. One concept in psychology holds that children have certain critical periods for learning from different experiences and after this period it is difficult, if not impossible, to learn from the experiences.

______ 4 In a child's cognitive development, there is a developmental sequence in the concept of conservation which is affected little by training.

Now turn to Answer frame 1^4 on page 24 to check your responses.

FRAME 2^4

EMOTIONAL DEVELOPMENT

The first emotional response, in the infant, is a generalized, undifferentiated one, and is usually referred to as *excitement.* After a few weeks, this general response becomes differentiated, at first into pleasant and unpleasant emotions, then into more finely differentiated emotions. Distress emerges first, disgust and anger somewhat later; the appearance of delight, elation and affection follows distress also.

Fear is an interesting case, because it does not seem to appear spontaneously in the earliest months but then does manifest itself, primarily in conjunction with strange surroundings or unfamiliar people. There seems to be a strong maturational component here.

The young child responds emotionally frequently, crying and raging over frustrations and disappointments, many such episodes being brief, and, alternatively, expressing jubilation and affection. Emotional control is not prominent at first, and emerges with the ability to delay gratifications and to have an understanding for the feelings and requirements of others as well as of ways of circumventing difficulties and achieving goals

There has been a great deal of interest in *innate emotional tendencies* and how these tendencies may be extended to situations not capable innately of evoking them. Early investigations suggested that the only innate emotions are *fear, rage,* and *love* and that there were only a few situations capable of arousing them. Fear, for example, was said to be evoked by loud sounds and loss of bodily support. Rage was evoked by restraint on bodily movement and love by stroking or manipulating body areas. It was shown in one experiment, with an infant named Albert, that fear of a white rat was not present initially but that it could be acquired if the appearance of the rat was associated with a loud sound. Further, the fear so learned also occurred to other furry objects such as a rabbit, a dog, and a sealskin coat. The interpretation given was that learning is responsible for most of the things we fear.

While it is undoubtedly true that learning can extend the range of objects and situations to which we will respond emotionally, the weight of opinion at present is that learning is less important than maturation in the emotional development of the early years. Further, the period of adolescence, with its physical and glandular changes, is a period of emotion and moodiness, over a wide range of cultures.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. The first emotional response in an infant is a generalized, undifferentiated one and is referred to as anger.

______ 2. Early investigations suggested that the only innate emotions are fear, rage, and love and that there were only a few situations capable of arousing them.

______ 3. The weight of opinion at present is that learning is less important than maturation in the emotional development of the early years.

______ 4. Emotional control is displayed quite early in a child's development.

Now turn to Answer frame 2^4 on page 24 to check your answers.

Answer frame 1^4

1. False. Psychological studies of children at various ages indicate that a child differs in many ways from an adult and a child's behavior is shaped by parents, peers, and the social class into which he has been born.
2. False. It is usually believed that a later stage is dependent on an earlier stage; i.e., that stages cannot be skipped.
3. True. The critical period is not necessarily correlated with any one stage of development and the loss after a critical period is passed is irreversible.
4. True. A child first achieves conservation of mass, then of weight, and then of volume. Training can have an effect of accelerating the development of conservation, but it does not seem very effective as compared with the natural development of this concept.

If you missed any of the above, you should restudy Frame 1^4 before turning to Frame 2^4 on page 23.

Answer frame 2^4

1. False. The first generalized response is excitement which, after a few weeks, becomes differentiated at first into pleasant and unpleasant emotions, then into more differentiated emotions.
2. True. Fear, for example, was said to be evoked by loud sounds and loss of bodily support. One experiment showed that fear of a white rat was not present initially, but could be acquired if the appearance was associated with a loud sound.
3. True. Learning can extend the range of objects and situations to which we will respond emotionally, but learning is less important than maturation in the emotional development of the early years.
4. False. The young child responds emotionally frequently with periods of crying and raging alternating with expressions of jubilation and affection. Emotional control is not prominent at first and emerges with the ability to delay gratifications and to have an understanding of the feelings and requirements of others.

If you missed any of the above, you should restudy Frame 2^4 before beginning Frame 3^4 below.

FRAME 3^4

PERSONALITY AND SOCIAL DEVELOPMENT

Infants vary from the day of birth. Some are active, others quiescent. Some are irritable, others placid. The attention of some is lasting, of others flighty. Such differences suggest important constitutional differences, but there is not much more that can be said in relation to the persistence of these differences into later life. Such differences, however, may have an indirect influence, because they interact with parental characteristics and thus have a role in determining the kind of environment in which the infant develops.

The young child's environment at first is typically, in the United States, that of his home and the people in it. Later the peer group and the school take a major role. Under the influence of *psychoanalytic theory*, however, major emphasis in the development of personality and social behavior has been placed on the events of childhood up to the school age.

Sigmund Freud proposed *psychosexual stages* of development. Sexuality was broadly defined and meant mainly the pleasure the developing individual could attain from the stimulation of zones of the body, called *erogenous zones.* The first stage is the *oral stage,* with gratification being obtained in the mouth area, from nursing, thumbsucking and putting objects into the mouth. The *anal stage* came next, being associated with expelling and retaining feces, and the *phallic stage,* the third one, involving pleasure through manipulation of the sex organs. At about school age, the child entered the *latency period,* in which sexual interest was said to be relatively inactive, and, finally, with the appearance of ordinary heterosexual interests, the *genital stage.* Erikson has also suggested a series of stages, the emphasis being on the interpersonal relationships involved and the ways in which one interacts with others.

While the Freudian stages are no longer believed to be an accurate portrayal of development, they have been very influential in focusing interest in development on events and interactions of the preschool period. There are two related reasons. One is that Freud believed that one could become *fixated* at a stage, thus not progressing into the later and more mature periods. Many personality disorders and mental illnesses were attributed to such fixations. The other is that Freud suggested that the *personality is essentially formed* by the end of the preschool period. Neither of these views is subscribed to fully by most investigators at present, partly because the research stimulated by Freud's views failed to substantiate his ideas in many ways.

Parental relationships are a major part of the interactions a young child has with other people, and to some extent they are focused on feeding practices and toilet training. Such activities are early areas in which *socialization* of the child, his induction into the ways of his culture, occurs. Much of the emphasis on *breast-feeding,* as opposed to bottle feeding, arose from Freudian hypotheses. Yet the research which these ideas suggested has not verified the advantages to emotional security proposed for breast-feeding. Similarly, early weaning was supposed to be emotionally disturbing and to leave permanent effects, but the evidence has not been supportive. What does seem to be important, however, is the mother's attitude. If she is confident, relaxed, and loving, the baby will experience little tension during feeding. The baby is apparently sensitive to the mother's mood and attitudes, with preferences for some foods corresponding to those of the mother.

Cleanliness training, often instituted during the second year, can be an area of conflict between child and parent. It is often instituted before the child is maturationally ready for it, usually at from 18 to 20 months, with resulting frustration and disturbance for child and parent. It is an area in which the child, perhaps for the first time, is able to "manipulate" his parents by playing on their concern, if it exists, over the regularity of his bowel movements and over the soiling of his clothes and their rugs. While toilet training is often of major concern to parents and figured importantly in Freud's anal stage, there is little evidence to support a direct relation between the details of this training and later personality traits.

In the early years, the child is also likely to experience the birth of a sibling or to have, himself, an older sibling. *Sibling rivalry* often appears, in which the older child experiences jealousy over the attention paid to the new baby by his parents and others. He may react in various ways, as by regressing to infantile behavior, by being annoying and "bad," in an apparent effort to gain attention, and perhaps by being aggressive to the younger child. Punishment is perhaps not the method of choice in dealing with these manifestations of sibling rivalry, as it may not be effective and in any case "treats" a symptom rather than the cause of the difficulty. Excessive use of punishment may be followed by the child's conceiving himself as being bad, and it may also lead to increased aggressiveness on the part of the punished child.

Attachments to people in the child's environment begin to emerge at about seven months, at about the same time that the child begins to react with disturbance to strangers. This attachment resembles but may not represent the same process as *imprinting.* Imprinting is seen in birds, like geese, which form an attachment to the first moving object they experience in a brief interval following birth (a critical period). Usually, of course, this object is the mother, but geese have become imprinted on humans if, after artificial incubation, a human is the first moving object to be seen. The attachment process is also seen in experiments with young monkeys, reared with a "wire mother" and a "mother" covered with terry cloth. The monkey preferred to spend his time with the latter and would run to "her" when frightened, even though his nursing bottle was fastened to the wire mother. Such evidence suggests that attachment is not a consequence of feeding but rather of contact. As will be brought out in a later chapter, contact with the terry cloth-covered mother was not sufficient to promote normal development.

Separation from the mother, once attachment has developed, produces, in monkeys and in children, substantial disturbance such as crying and agitated behavior. When separation is prolonged, this disturbance gives way to withdrawal and apathy. Substitute mothering can reverse this trend.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. The personality of an infant at birth has a direct bearing on his adult personality.

_______ 2. Most psychologists accept Freud's proposed psychosexual stages of development as an accurate portrayal of development.

_______ 3. One important aspect of feeding with infants is the mother's attitude.

_______ 4. Attachments to people in the child's development begin to emerge at about seven months, at about the same time that the child begins to react with disturbance to strangers.

Now turn to Answer frame 3^4 on page 28 to check your answers.

FRAME 4^4

Identification. Personal and social development seems to occur, early and for a long interval, on the basis of *identification with others.* Between two and three, many children show a negativistic period during which their response to parental commands and requests is often "no," but the early identification figures are usually the parents. This is often shown in their play activities, the boy playing at "manly" tasks, the girl at "womanly" tasks, the sex-role character of the play becoming more divergent after the age of five than before. The rewarding activities of the parent and the warmth he shows toward the child are factors in leading the child to identify with him. Children seem to obtain their early sex-role identifications from the like-sexed parent, although characteristics and attitudes that are not sex-typed can come, by identification, from either parent. Identification with other children and with adults outside the home, of course, plays a further role in development once the child enters school.

One consequence of identification is taking over the standards of conduct, or the *morality,* of the persons with whom the child identifies. Initially, the child probably has little moral sense, and his behavior is mainly controlled by how the parent reacts in his presence. Later, however, the standards of the parent become internalized, and the child controls his behavior in accordance with them. Not specifically couched in terms of identification, one view is that there are *stages* in moral development. The first *(preconventional)* includes the governance of behavior to avoid punishment and to obtain rewards. At the second stage *(conventional),* conformity to standards avoids the disapproval or the dislike of others and censure from authority. The *postconventional* level leads to conformity in order to maintain the respect of the "impartial spectator," who judges in the light of community welfare, and to avoid self-condemnation. The first stage governs up to age 7 and at 16 the second level predominates. Presumably, the third stage manifests itself to a dominant degree at still later ages.

There are, of course, other periods of development than those we have stressed at which major changes occur which are associated with personality development. Among these are adolescence, the achievement of adult maturity, vocational choice, marriage, and retirement. It is not possible in the brief space of this PLAID to discuss these periods of adjustment.

Development of attitudes. We all have views, referred to here as *attitudes,* with respect to many things. For example, we have attitudes toward political issues, and the attitudes can be characterized as liberal or conservative, with varying degrees of each. In children, attitudes correspond fairly well with those of their parents. Thus the child is likely to regard political parties, social problems and issues, and minority groups in much the same way as do his parents. However, at about adolescence, changes begin, and the period of change lasts to about age 30. In the typical case, attitudes change little after this age.

During adolescence, the individual's *peers* begin to influence his attitudes. This influence arises partly from contact, as the adolescent spends more time with his peers and less with his parents than at earlier ages. It is a common observation that in the teen-age years the attitudes and values of parents are rejected and those of the peer group are accepted. *Education* contributes to the development and change of attitudes, degree of education being usually found to relate to the liberalism of one's attitudes. There is evidence that there are, on an average, generational shifts. For example, a rise in liberalism and a decrease in ethnic prejudice have occurred over a 35-year period in individuals of the same social class but of different generations. No doubt these shifts have been contributed to by education and by other factors such as the problems the nation faces, the court decisions which have occurred, and the like, all communicated fully through education as well as the news media.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Personal and social development occur, early and for a long interval, on the basis of identification with others.

______ 2. One consequence of identification is the taking over of the standards of conduct or morality of the persons with whom the child identifies.

______ 3. It is believed that there are stages in the normal development of standards of behavior.

______ 4. Throughout his life, a person's attitudes are influenced most greatly by his parents.

Now turn to Answer frame 4^4 on page 28 to check your answers.

Answer frame 3^4

1. False. However, differences in infants' personalities may have an *indirect* influence on their later personalities because they interact with parental characteristics and, thus, have a role in determining the kind of environment in which the infants develop.
2. False. The proposed Freudian stages of development are not believed to be accurate, but they have been very influential in focusing interest in development on events and interactions of the preschool period.
3. True. If the mother's attitude during feeding is confident, relaxed, and loving, the baby will experience little tension during feeding for the baby is apparently sensitive to the mother's moods and attitudes.
4. True. Separation from the mother, once attachment has developed, produces substantial disturbance such as crying and agitated performance. Prolonged separation leads to withdrawal and apathy. Substitute mothering can reverse this trend.

If you missed any of the above, you should reread Frame 3^4 before turning to Frame 4^4 on page 26.

Answer frame 4^4

1. True. Early identification figures are usually the parents; identification with other children and adults outside the home plays a further role in development once the child enters school.
2. True. As the standards of his parents become internalized, the child controls his behavior in accordance with them. Later the child's standards change as he identifies with his peers and other outside groups and individuals.
3. True. The first (preconventional) stage includes the governance of behavior to avoid punishment and to obtain reward. At the second (conventional) stage, conformity to standards avoids the disapproval of others. The postconventional level leads to conformity in order to maintain community and self-respect.
4. False. It is a common observation that in the teen-age years the attitudes and values of parents are rejected and those of the peer group are accepted. Education contributes to the change of attitudes.

If you missed any of the above, you should restudy Frame 4^4 before beginning Chapter 5 on page 29.

chapter 5

BASIC PHENOMENA AND PROCESSES OF LEARNING

FRAME 1^5

Hereditary and maturational mechanisms largely account for the physical structures and mechanisms underlying behavior, and in the lower forms of animal life other factors play a subsidiary role. But with more complex organisms, such as man, *learning* assumes an important role in determining behavior. Learning is a relatively permanent modification in behavior for which practice or experience is a necessary condition. This definition does not include as instances of learning behavior changes which occur as the result of injury, growth, and maturation (which, though permanent, do not involve practice), or changes resulting from motivation, fatigue, and changes in the sensitivity of the organism's receptors. These factors are not permanent, but they do point up a distinction which is sometimes important. This is the distinction between *habit*, a result of learning, and *performance*. One has many permanent habits, so that they are with him all the time. But we perform any one of our habits, typically, only occasionally, as, for example, when we are motivated to do so. Fatigue, on the other hand, might prevent the performance of a habit. Performance, then, is a complex result of a number of factors, and it sometimes requires considerable ingenuity to discover which one is at work.

Learning has been studied in a number of situations with animals and with humans. In the present chapter we concentrate on work carried out primarily with animals, although many of the situations are used with humans also. In the next chapters we examine processes studied primarily in the human. We study learning in animals, both because the topic is interesting in itself and because it is widely believed that at least some learning processes are common to humans and animals.

CLASSICAL CONDITIONING

This kind of conditioning, initially described by the Russian physiologist *Ivan Pavlov*, was for a long time thought to be the only kind of conditioning. With the delineation of other kinds of conditioning, the priority of Pavlovian conditioning, as it is also called, led it to be referred to as *classical conditioning*. This term does designate a certain set of procedures for conditioning, which will now be described.

Pavlov studied digestive processes, and he noted that secretions of the salivary glands and of gastric juices often took place before food was introduced into the mouths of the dogs with which he worked. He called these secretions "psychic secretions" at first and set about to study them systematically. To do so, he worked with dogs in which he had brought the duct of a salivary gland to the surface of the cheek, by means of surgery. This permitted the collection and measurement of the amount of saliva produced. Pavlov changed his terminology from psychic secretion to *conditioned reflex* and added some other terms. His procedure was to pair a stimulus, a tone, say, which before training does not elicit salivation, with the placement of food, food powder, or acid, which do elicit the secretion, in the mouth. The food is referred to as an *"unconditional stimulus"* or US, and the tone in the example is referred to as a *"conditional stimulus"* or CS. The occurrence of salivation to placement of food in the mouth is an unconditional reflex, or UCR, whereas the occurrence of salivation in response to the CS is a conditional reflex or CR.

Pavlov observed that repeated pairings of the tone and food resulted in an increase in the amount of salivation to the tone (measured on test trials, on which food is omitted). Similarly, *Bekhterev*, another Russian, showed that he could condition a limb flexion response in an animal by pairing a CS with shock to the paw, the US.

It is usually said that the formation of a CR occurs most readily when the CS precedes the US by a half second, although Pavlov was able to form a *trace reflex*, in which the CS was turned off before the US occurred, and a *delayed CR*, in which there was a substantial interval between the onset of the CS and that of the US, the CS remaining active through the interval. *Backward conditioning*, i.e., the case where the US precedes the CS, does not seem to occur or to occur readily. The basic relation between CS and US, then, is one of pairing or contiguity in time, although the best result, as just said, obtains when CS precedes US. The CR tends to occur before the US where it can be measured separately. In other words, it tends to *anticipate* the occurrence of US.

The CR develops over pairings of the CS and US, often called trials. What happens if US is omitted? When over several trials US is omitted, the CR diminishes and may disappear. This is called *extinction*. After a period of time in which neither CS nor US is presented, however, occurrence of CS will again elicit the responses. This is called *spontaneous recovery*. Or if, after extinction, reconditioning is carried out, i.e., CS *and* US are again paired, *reconditioning* takes place more rapidly than did the original conditioning.

There are a number of other processes which Pavlov studied. Many of them pertain also to our next topic, and we will discuss them there. Before leaving classical conditioning, however, a few other points must be made. Many responses are conditionable, including gastrointestinal secretions, blood vessel changes, the electrical resistance of the skin, heart rate, and immunity reactions. Also stimuli can be internal (interoceptive) as well as external. Much conditioning no doubt occurs, as these examples suggest, in the human without awareness. Emotional responses can be conditioned, as in the case of Albert and the rat, discussed in the last chapter. Conditioning can occur quickly, as in one trial, though it often requires a number of trials, as we have said. It appears that conditioning can occur in organisms as simple as the flatworm (Planaria) and as complex as man.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. Learning is a relatively permanent modification in behavior which includes changes which occur as the result of injury, growth, and maturation.

_______ 2. Habit and performance are synonymous.

_______ 3. Pavlovian conditioning (classical conditioning) involves pairing a conditional stimulus (tone) with an unconditional stimulus (placement of food in the mouth), leading to a conditioned reflex (salivating) in response to the conditional stimulus.

_______ 4. When over several trials the unconditional stimulus is omitted, the conditioned response diminishes and may disappear in a process known as extinction.

Now turn to Answer frame 1^5 on page 32 to check your responses.

FRAME 2[5]

INSTRUMENTAL LEARNING OR OPERANT CONDITIONING

The study of this kind of learning began as early as or earlier than Pavlov's work, and two American investigators were early students of it. W. S. Small investigated the learning of *mazes* by rats, using a miniaturized replica of the maze constructed with hedges at Hampton Court Palace in England. E. L. Thorndike studied the factors involved in the learning by cats to escape from *puzzle boxes.* The essentials of the process, however, are best described in conjunction with other situations.

Imagine a box, empty save for a lever protruding from one side and a small opening from which food can be delivered. These features are the essential ones of a *Skinner box,* named after B. F. Skinner who developed it. A hungry rat, placed in the box, will eventually depress the lever, and this act causes the delivery of a food pellet. (A similar box, used with pigeons, is equipped with an illuminated disk, instead of a lever, which the pigeon pecks. Grain is delivered through the food mechanism.) What effects follow? The rat, after a delay, will press the lever again and then again, the rate of lever-pressing increasing with time in the box, until he satisfies his hunger. This phenomenon is called *instrumental* or *operant conditioning.*

In classical conditioning, the animal does nothing to control the delivery of US (e.g., food). Food will be delivered whether he salivates or not, and the food elicits the salivation. The CR, in other words does not operate on the environment to produce the food; i.e., the CR is not instrumental to the delivery of the food. In instrumental or operant conditioning, however, the CR (the lever-press) is a prerequisite for food delivery; i.e., its occurrence is instrumental in producing the food. The animal operates on the environment by means of the lever-press and receives the food for so doing. The food does not elicit the CR; rather the animal *emits* it and gains food as a result. Thus operant and classical conditioning differ. It is still an unsettled question whether these differences mean that different learning processes go on in the two cases.

The presentation of the US in classical conditioning and of the food (or other "reward") in operant conditioning is referred to as *reinforcement.* Reinforcement strengthens response, with strength being measured in classical conditioning by the percent of trials on which the CR occurs or by the size of the CR (e.g., drops of saliva) and in operant conditioning by the rate of lever-pressing or key-pecking.

Reinforcement can be given on every trial, in which case it is referred to as *continuous reinforcement,* or it can be omitted on some portion of the trials, in which case it is called *partial* or *intermittent reinforcement.* There is evidence in classical conditioning that acquisition is less rapid under partial than under continuous reinforcement, but that extinction is not as fast after partial as after continuous reinforcement. Intermittent reinforcement has been studied extensively in the case of operant conditioning, once the response has been acquired. Without any reinforcement, conditioned operant responses will extinguish, as will classical CRs. Schedules of intermittent reinforcement, however, have been found to have most interesting effects. There are four basic schedules, although many variations and combinations (multiple schedules) can be used:

1. *Fixed interval schedule.* Reinforcement occurs only after so many minutes have passed.
2. *Variable interval schedule.* The time interval is not constant but the intervals are arranged to average to a given number. Thus VI5 would mean that the intervals might range from 1 minute to 9 minutes, but their average would be 5.
3. *Fixed ratio schedule.* Reinforcement occurs only after the animal has made a certain number of responses.
4. *Variable ratio schedule.* The number of responses required ranges around an average; a VR20, for example, might include reinforcements for any number of responses from 10 to 29, averaging 20.

Stable response rates are generated by the interval schedules, the fixed interval schedules, however, producing the bulk of their responses toward the end of the interval, whereas responses are distributed more evenly for the variable interval schedule. The animal's motivational state is important to the actual response rate these schedules develop. In the ratio schedules, very high response rates are engendered, especially when many responses are required for a reinforcement.

Answer frame 1^5

1. False. Practice or experience is a necessary condition for learning.
2. False. A habit is a result of learning. But we perform our habits only when we are motivated to do so, and factors like fatigue might prevent the performance of a habit. Performance is a complex result of a number of factors of which habit is only one.
3. True. By relating the conditional stimulus (tone) with food, Pavlov was able to condition the dog to salivate simply by sounding the tone.
4. True. After a period of time in which only the conditional stimulus and not the unconditional stimulus is presented, extinction may occur. However, occurrence of the conditional stimulus after a period of time will again elicit the response. This is called spontaneous recovery.

If you missed any of the above, you should restudy Frame 1^5 before turning to Frame 2^5 on page 31.

Frame 2^5 continued

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. In classical conditioning, the conditional response is a prerequisite for food delivery; i.e., its occurrence is instrumental in producing the food.

______ 2. B. F. Skinner developed a box (Skinner box) which is used in instrumental or operant conditioning where a conditioned response (pushing a lever) is a prerequisite in producing food.

______ 3. The presentation of the unconditional stimulus in classical conditioning and of food in operant conditioning is referred to as reinforcement.

______ 4. There is evidence in classical conditioning that acquisition is less rapid under continuous reinforcement than it is under partial reinforcement.

Now turn to Answer frame 2^5 on page 34 to check your answers.

FRAME 3^5

Shaping. In classical conditioning, the form of the response depends to some extent on the US, and the occurrence of the response is a result of US. It is possible, with operant conditioning, to determine the form of the CR. The technique is known as *shaping*. In this procedure reinforcement is applied when the animal makes any movement, even a very slight one, in the direction the experimenter desires. Suppose that we wish a pigeon to walk "tall." Reinforcement is given for every time the head is raised and withheld for downward movements of the head. By reinforcing successively approximations to the desired posture, it is possible to shape the bird's behaviors to accord with the standard set. Very complex performances may be engendered in this way, as shown in animal shows often seen on TV or at Marineland.

It has long been thought that operant conditioning was not applicable to responses mediated by the autonomic nervous system. Recently, however, it has been shown that *heart rate* and *intestinal contractions* can be governed by operant procedures. The critical experiments were done in curarized animals. *Curare* is a drug which prevents movements in the skeletal muscles but does not affect movement of the heart and viscera. Reinforcement was given by electrical stimulation of regions of the brain known to be reward centers. Reinforcement, for example, of either increases or decreases in heart rate in rats resulted in the expected changes. This discovery may have important implications for treatment of a number of emotional conditions, those, for example, like anxiety which involve visceral responses. Classical conditioning, too, seems capable of use in certain treatment procedures and has, in fact, been employed in procedures known as *desensitization.*

We have spoken of reinforcement, in the case of food or shock. These reinforcers are referred to as *primary reinforcers,* because no learning is necessary for them to work. There is another class of reinforcers, effective in both classical and operant conditioning, known as *secondary reinforcers.* The tone, used as CS in the classical conditioning procedure, may itself, after training, be used as the US in conjunction with another CS (a light, for example) and produce a CR. The tone has acquired its reinforcing power, of course, from being used originally as a CS. Pavlov called this phenomenon *"higher order conditioning"* and was able with difficulty to condition still another stimulus to one with the status of the light in the example. It does not seem possible to extend higher order conditioning very far, however, with the ordinary techniques, because extinction occurs with the omission of primary reinforcements.

Another phenomenon common to both types of conditioning is *stimulus generalization.* We can illustrate this phenomenon by using the tone in the original example of classical conditioning. Let us say that the tone was at the pitch of middle C on the piano, 256 Hz. After conditioning is established, we can then test whether other tones, say 200 or 312, will also elicit the CR. They do, although the magnitude of the CR is somewhat less with them than it is for the original tone. The CR, then, established to one stimulus generalizes to other, similar stimuli. Of course, we can eliminate generalization through *discrimination training.* This is accomplished by presenting the other tones without reinforcement, while reinforcing the specific CS. Quite precise discriminations can be achieved in this way, in both human and animal subjects.

As already suggested, the phenomena of generalization and discrimination occur in operant conditioning. The operant CR is not elicited, as is the classical CR, but it can be made to occur in the presence of a stimulus, like a tone, but not otherwise. Generalization can then be tested to other tones, and training in discrimination can be accomplished.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Shaping is the procedure whereby reinforcement is applied when the animal makes any movement, even a slight one, in the direction the experimenter desires.

______ 2. Operant conditioning cannot result in changes in the autonomic nervous system such as heartbeat.

______ 3. The tone used as a conditional stimulus in classical conditioning may itself, after training, be used as the unconditional stimulus in conjunction with another conditional stimulus (a light) and produce a conditioned response.

______ 4. Stimulus generalization (using various tones) may be eliminated through discrimination training.

Now turn to Answer frame 3^5 on page 34 to check your answers.

FRAME 4^5

Aversive stimuli. These stimuli are used more often in the study of learning than the foregoing account would suggest. We have mentioned the classical conditioning of leg flexion when US is a shock, but there are other ways in which aversive stimuli can be used. These ways can be classified as instrumental conditioning because in them the response serves to escape or even to avoid the shock.

Answer frame 2^5

1. False. In classical conditioning, the animal does nothing to control the unconditional stimulus (food). Food will be delivered whether he salivates or not.
2. True. The food does not elicit the conditioned response; rather, the animal *emits* it and gains food as a result. Thus operant and classical conditioning differ.
3. True. Reinforcement strengthens response, with strength being measured in operant conditioning by the rate of lever-pressing.
4. False. Acquisition is faster under continuous reinforcement, but extinction is slower when partial reinforcement is used.

If you missed any of the above, you should reread Frame 2^5 before turning to Frame 3^5 on page 32.

Frame 3^5 continued

Answer frame 3^5

1. True. By reinforcing successively approximations to the desired movement, it is possible to shape an animal's behavior to very complex behavior patterns.
2. False. Reinforcement of either increases or decreases in heart rate in rats resulted in the expected changes.
3. True. Pavlov called this phenomenon "higher order conditioning" and was able to condition still another stimulus to one with the status of the light in the example.
4. True. Quite precise discriminations can be achieved by presenting the other tones without reinforcement while reinforcing the selected tone.

If you missed any of the above, you should restudy Frame 3^5 before turning to Frame 4^5 on page 33.

Frame 4^5 continued

In *escape training*, the subject receives the shock, but his response "escapes" it. For instance, the shock to the paw could be administered through the floor, rather than through an electrode attached to the paw. Then the flexion response would escape the shock. If the interval between the occurrence of the CS and that of the US is long enough, the response can anticipate the shock; i.e., the paw can be off the floor before the shock occurs. In this case, the shock is *avoided* altogether. *Escape* and *avoidance conditioning* are usually said to be more effective ways of learning than is *classical aversive conditioning.* One would expect avoidance conditioning to extinguish very rapidly, because the US is avoided. However, if the shock is intense, avoidance responses can persist a long time, despite the prediction from the principle of extinction. One explanation is that it is *fear* or *anxiety* that maintains avoidance responding, the fear being elicited by the CS after it is paired with the shock. This is an attractive interpretation, but it has its difficulties in the views of a number of investigators.

Animals can learn not to respond as a way of avoiding noxious stimuli, and this case is referred to as *passive avoidance* in contrast to *active avoidance* as in the example just given. *Punishment,* by the way, is thought not to eliminate responses but rather to suppress them, perhaps as in the case of passive avoidance. There are many writers who feel that punishment is an undesirable way of influencing responses because of this fact and the emotional disturbance it produces.

COMMENT

Our discussion of classical and instrumental conditioning has perhaps left the impression that all simple learning is studied by these techniques or consists only of these processes. Neither impression is true. The problem box and the maze have been important vehicles for the study of learning and, while they may be regarded as examples of instrumental learning, their use has led to the concept of *trial and error* and the *law of effect.* Both ideas come from Thorndike. The first is like shaping but is not controlled by the experimenter. Rather, it describes the fact that early in learning the animal makes many erroneous responses before he makes the correct one. Many of these errors are then eliminated in the course of the trials of a learning task. This change is thought to be due to the effect of reward, which correct responses obtain; i.e., to the law of effect. This law is a precursor of the *principle of reinforcement,* mentioned in the discussion of conditioning.

Animals and, of course, people can learn other things than to make specific responses to stimuli. They can learn relations among stimuli, for example, sometimes referred to as *perceptual learning.* For example, we can construct an open maze in the shape of a cross. Let us start the animal from the bottom part of the cross and block his entry to the upper part. When he moves to the center of the cross, then, he must turn either left or right, and whichever way he turns one will give him food when he reaches the end of that section of the maze. Suppose, then, that on the next trial we start him at the top of the maze, blocking off the lower section. Which way will he turn at the center? If he turns the same way as he did before, he will be going away from the side on which he previously received food. If he turns the other way, his movement is the opposite of the one he made before. In this situation, the animal will turn the other way, indicating that he has learned where the food is located rather than a specific turn. Similarly, animals, allowed to explore a complex maze without reward, will, when reward is introduced, run the maze more efficiently than animals not given the exploratory experience. Such experiments imply that animals can learn about their environments, what stimuli go with what, or what stimuli denote rather than being restricted to learning specific responses. Animals like monkeys can also become very proficient in solving problems of the same class. Given the task of finding food under one of two objects, the objects differing on each trial, the animals after much practice are able to solve them very quickly as compared with their performances on the first problems of the series. This phenomenon is referred to as a *learning set.*

There are many unsettled issues in the area of learning, the issues having to do with theoretical accounts of the learning process. For a long time some theorists held that learning was *response learning,* and they were opposed by those who believed that *perceptual learning* can and does occur. There is a tendency to argue that learning exemplifies *association principles,* such as that learning occurs if two stimuli are contiguous (together) in space or time or if a stimulus and response occur together (as in classical conditioning). Other investigators believe that learning is much more *cognitive* than this, involving expectancies and their confirmation or disconfirmation and hypotheses. We cannot go into these controversies here.

Another issue is the nature of reinforcement. Some writers have held that the reduction of a drive or other source of tension is necessary for reinforcement to occur. This view now seems to be inadequate, as there is abundant evidence that increases in stimulation or tension can often reinforce a response. There are other theories of reinforcement which have been advanced to replace the *tension-reduction theory,* but the theory of reinforcement is not yet entirely resolved.

The investigation of "simple" learning, even at the animal level, has turned out to involve many complexities. These include difficulties in manipulating variables and in finding sensitive measures of responses. Also, it is the case that theories have not always provided hypotheses stated clearly enough so that unequivocal tests of their validity can be made. Given this situation in the study of simple learning in animals, we can expect similar problems as we examine, in the next chapters, complex situations and learning processes in human beings.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. In classical aversive conditioning, the unconditioned stimulus is a direct shock.

_______ 2. Punishment is thought not to eliminate responses but rather to suppress them, as in the case of passive avoidance.

_______ 3. Perceptual learning is the term used to describe the ability of animals to learn relations among stimuli.

_______ 4. The study of learning by animals has shown how simple the learning process really is—we learn to do what is rewarded and not do what is punished.

Now turn to Answer frame 4^5 on page 38 to check your answers.

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chapter 6

HUMAN LEARNING AND MEMORY

FRAME 1^6

We all know that we can remember some things but that we forget others. In general, we refer to the phenomena of remembering and forgetting by the term *memory,* and this term designates an area of inquiry in psychology which reaches back into the decade of the 1870s for its origin. Over the near-century during which memory has received study, many problems have been investigated and a variety of theories have been proposed. We here review some of the landmarks in this field of inquiry.

To remember something, there are at least three factors that must be considered: First, did we actually know at one time what we now try to remember? In other words, was it learned or, in a current metaphor, was it *stored?* Second, given that it was stored, is it still there? Is it still *available?* And, finally, given that it is still there, can we get to it or retrieve it? Is it, in other words, *accessible?* These three questions form a framework in terms of which we can examine the topic of memory.

EARLY RESEARCH

Hermann Ebbinghaus began the systematic study of memory in 1878, publishing his results in 1885. He realized that in order to examine memory he must know whether and to what degree the material to be remembered was present to begin with, and much of his investigation was concerned with variables introduced at the time of acquisition so that he could determine what effects these variables have on the ability to remember later; i.e., on the retention of what was learned. Ebbinghaus, who served as his own subject, thus learned materials under specified conditions and measured their retention at a later time.

Ebbinghaus was an associationist, and he sought units of material of equal value which he could associate together. He rejected words, sentences and stories as materials, because he thought they were too complex and too unequal in meaning to serve his purposes. So he invented the *nonsense syllable*, a unit consisting of a consonant, vowel, and consonant, in that order. Later work shows that these units are not equal in meaningfulness, but Ebbinghaus did not know this, although he did note that lists of syllables varied in their difficulty. Ebbinghaus arranged his syllables, in a given experiment, in the form of a list of at least seven items but often much longer. He read each list in order from the first to last syllable until he felt that he had memorized the items in order *(serial learning)*. Then he would put it aside until later, when he would relearn it. Ebbinghaus measured the time it took him to learn the list. Later, he measured the time required to relearn the list. He measured retention in terms of the differences in learning time for the list on the two occasions. A second list will usually take less time to relearn than it took to learn; i.e., relearning shows a *savings* in learning time. Ebbinghaus measured retention by means of this savings method.

Ebbinghaus's serial learning method has been modified in later work. In the method of *serial anticipation learning,* the first item is presented and the learner is to anticipate what the next item will be, before it is presented. When this item is shown, he is to anticipate the next one, and so on. Another method, *paired-associate learning,* is used now much more frequently than serial learning. In it, the learner is to learn pairs; i.e., he is to become able to give, on presentation of one member of a pair, the other member. The pairs are presented in such a way as to minimize serial learning. A third, commonly used, technique is *free recall.* In this procedure, a list of up to 40 items is presented and the subject is to recall them in any order in which they occur to him. When more than one trial is given, the technique is called *free-recall learning* (sometimes free learning). It is probably safe to say, also, that words have replaced nonsense syllables as the most commonly used materials in studies using these methods.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. To remember something, there are at least three factors that must be considered.

______ 2. The systematic study of the phenomena of remembering and forgetting was begun by Freud in the early 1900s.

______ 3. Ebbinghaus was an associationist, and he sought units of material of equal value (nonsense syllables) which he could associate together.

______ 4. Ebbinghaus's serial learning method involves the learning of pairs in a series.

______ 5. Words have now replaced nonsense syllables in most learning studies.

Now turn to Answer frame 1^6 on page 38 to check your responses.

FRAME 2^6

THE EFFECT OF CERTAIN VARIABLES ON LEARNING

A number of variables have been studied with the different learning techniques. One can look at these variables in two ways. In one we determine what effect they have on original learning time or trials, i.e., how do they affect the rate of learning to some *criterion of mastery,* such as being able to produce all the items of a list correctly at one time? The other is their effect on *retention,* i.e., on performance on *relearning* (or *recognition* or *recall*) after an interval since the criterion of mastery was reached.

Answer frame 4^5

1. True. Direct shock is used in classical aversive conditioning. But escape and avoidance conditioning are said to be more effective ways of learning than classical aversive conditioning.
2. True. There are many writers who feel that punishment is an undesirable way of influencing responses because of this fact and the emotional disturbance it produces.
3. True. Perceptual learning is exemplified in the case of the rat who learned to turn toward the food in a cross-shaped box regardless of which direction he was headed.
4. False. Although scientists have learned much through studying animals, the investigation of simple learning at the animal level has turned out to involve many complexities which we are just beginning to understand.

If you missed any of the above, you should restudy Frame 4^5 before turning to Chapter 6 on page 36.

Frame 1^6 continued

Answer frame 1^6

1. True. Do you remember them? (1) Did we actually know at one time what we now try to remember? (2) Given that it was learned (or stored), is it still there (available)? (3) Given that it is still there (available), can we get to it or retrieve it? Or is it, in other words, accessible?
2. False. Hermann Ebbinghaus began the systematic study of *memory* in 1878, publishing his results in 1885.
3. True. Ebbinghaus rejected words, sentences, and stories as materials because he thought they were too unequal in meaning. Instead, he used nonsense syllables (consonant, vowel, consonant), which later also proved to be unequal in meaning.
4. False. Ebbinghaus's serial learning involves learning a list of at least seven items in order (serial). Paired-associate learning, which is now used more frequently, involves the learning of pairs; i.e., given one member of a pair, you are to give the other.
5. True. Learning of words is much more common today.

If you missed any of the above, you should restudy Frame 1^6 before turning to Frame 2^6 on page 37.

Frame 2^6 continued

It is not necessarily the case that a variable will have an effect on both learning time and on retention. This is because retention, with some exceptions, depends primarily on the *degree of original learning*, and is not influenced by learning time so long as the same criterion of mastery is reached despite varying learning times.

For example, it is known that the *meaningfulness* of nonsense syllables is related to learning times for lists. Meaningfulness is measured by determining the number of words a person can think of when he is presented with a syllable, and nonsense syllables differ in this characteristic. A serial list of syllables that are meaningful or a paired-associate list in which the pair members are meaningful will be learned faster than a list whose syllables are low in meaningfulness. Yet, if the same criterion of mastery is required for the lists at both levels of meaningfulness, retention does not differ. Similarly, there are fast learners and slow learners. Again, if they are brought to the same criterion of mastery, their ability to remember does not differ.

Rates of learning have been found to differ with the following variables, aside from meaningfulness and ability:

It takes longer to learn a lot of items than to learn a few and, more importantly, the time per item is greater for the long than for the short lists. Relatively short lists, 5 to 7 items, for example, can be learned in a single presentation by college students, whereas a list of from 10 to 14 items will take a number of trials. *Concrete words,* which easily evoke *images,* are learned more rapidly than *abstract words,* which are difficult to image. Learning is not as rapid, in terms of trials, if the items are presented briefly, as it is when they are shown for a longer time, although there is some evidence in favor of a trade-off between item time and trials, with the resulting *total time per item* being essentially a constant. For some tasks, learning is facilitated when the practice is carried out in a *distributed* manner, rather than *massed.* Distribution means spreading out the practice over time, over days, for example, rather than concentrating it all at once, as on one day.

Interitem relationships are very important to learning rate. If the items of the list are conceptually related, if they are word associates of one another or similar in other ways, it takes less time to learn them by free recall than when they are dissimilar or unrelated. On the other hand, when a specific order is required as in serial learning or specific associations are necessary, as in paired-associate learning, item similarity makes learning very slow. Learning is facilitated, in the serial and paired-associate cases, if the subject links the items by putting them into sentences or making up images which interrelate them. An active attitude, an *intention to learn,* leads to faster acquisition than a passive attitude. There is abundant evidence that subjects usually do not learn passively but rather that they engage actively in *strategies* and *techniques,* even in the rote learning of nonsense syllables, to accomplish their tasks.

We have spoken of relearning as a way of measuring retention through savings. One can also measure retention by *recall,* in which a cue is given and the subject tries to remember the response, or by *recognition.* In the latter case, previously learned items are mixed with new items, and the subject is asked to indicate which ones he has experienced before. It is often said that recognition and relearning are more sensitive indicators of what is retained than is recall and many data support this conclusion.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Retention depends primarily on how rapidly the subject is learned by an individual.

______ 2. Fast learners have a much greater ability to remember than slow learners.

______ 3. The time it takes to learn each item is less with long lists than with short lists.

______ 4. An active attitude, an intention to learn, leads to faster acquisition than a passive attitude.

______ 5. Recall is the most sensitive indicator of what is retained.

Now turn to Answer frame 2^{6} on page 40 to check your answers.

FRAME 3^{6}

FORGETTING

As we shall see in a moment, forgetting has received a great deal of study and there are conditions of which it seems to be a function and theories as to the factors responsible for it. It can be decreased if, during original learning, the following steps are taken. One is to *overlearn* the material to begin with. By overlearning is meant that study continues beyond the point of bare mastery. Starting with Ebbinghaus, the evidence consistently shows that retention (the opposite of forgetting) is a function of degree of original learning, and overlearning represents a high

Answer frame 2^6

1. False. Retention, with some exceptions, depends primarily on the degree of original learning and is not influenced by learning time so long as the same criterion of mastery is reached.
2. False. Again, if they are brought to the same criterion of mastery, fast learners and slow learners do not differ in their ability to remember.
3. False. Relatively short lists, 5 to 7 items, for example, can be learned by college students in a single presentation, whereas a list of 10 to 14 items will take a number of trials and the time per item is greater.
4. True. There is much evidence that subjects do not learn passively.
5. False. Recognition and relearning have been found to be more sensitive than recall in indicating what is retained.

If you missed any of the above, you should reread Frame 2^6 before turning to Frame 3^6 on page 39.

Frame 3^6 continued

degree of such learning. It is also known that *distribution of practice* facilitates retention, even when degree of original learning is equated. In one study, for example, a list was given over several days in one group the same number of trials that another group had on one day. Retention of the list given distributed practice was about 70 percent eight days after learning, whereas retention after massed practice was only 14 percent.

Forgetting is likewise prevented when a large part of the learning period is devoted to active *rehearsal* or *recitation*, rather than to just reading the materials. For example, in one experiment retention was only 15 percent four hours after learning when all the study time was devoted to reading the material. But it was 48 percent when 80 percent of the study time had been devoted to recitation. Being tested on the materials also retards forgetting.

Before leaving the study of learning of verbal material, with which we have been chiefly concerned so far, it should be mentioned that *programmed learning* and *computer-assisted instruction* have recently received prominence as means of facilitating learning. Although the use of "teaching machines" and the computer is often emphasized in discussions of these developments, the hardware serves primarily to permit individual presentation of material to an individual learner so that he can proceed at his own pace. Further, the "programs" consist first in breaking up the material to be learned into units and then arranging the units in a sequence such that later steps are not introduced until mastery of the earlier steps has been accomplished. In addition, *immediate feedback* as to the learner's correctness is provided at every step of the way. The utility of these methods, in comparison with standard procedures used in school learning, is yet to be fully assessed, although there are many reports that they result in achievement for many subjects which is at least as good as that accomplished by traditional methods.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_____ 1. One is more apt to forget material if he has overlearned it.

_____ 2. Retention is increased if the subject is learned all at one time rather than spaced out over time.

_____ 3. Forgetting is lessened when a large part of the learning period is devoted to active rehearsal or recitation, rather than to just reading the materials, and when the learner is tested on the material.

_____ 4. Programmed learning and computer-assisted instruction have recently received prominence as a means of facilitating learning.

Now turn to Answer frame 3^6 on page 42 to check your answers.

FRAME 4[6]

Decay theory and interference theory. Ebbinghaus observed that when a list was learned just for mastery, forgetting was rapid and substantial. After 24 hours the savings were only 34 percent, with further losses as time increased. How may this massive *forgetting* be explained (ways to counter it were discussed just now)?

The two major views of forgetting are *decay theory* and *interference theory*. The Freudian theory that forgetting is due to the mechanism of *repression* is one kind of interference theory. Remember that in Ebbinghaus's case we can be sure that the material forgotten had been learned and that the appropriate cues were present for its recovery. These views of forgetting then are attempts to explain the apparent unavailability of responses.

The simplest decay theory says that the representation of what was learned (called a *trace*) simply disappears because of the metabolic events occurring in the brain through time. The interference theory says, however, that it is *what happens in time* that determines whether forgetting will occur and, if so, how much. As a test of this theory, we can compare retention following learning when the interval was spent in sleeping and when it was spent in normal waking activity. When this is done, forgetting is less after the inactive period of sleep than it is after normal waking activity. The weight of opinion at the present is that, in long-term memory, a simple decay theory does not fit the evidence very well. One source of evidence against decay theory is that electrical stimulation of parts of the exposed brain, in patients being operated on for other reasons, results in remarkably vivid memories of the past, memories that would not ordinarily be retrieved without such stimulation. It may be, though it is impossible to say with certainty, that once something is well learned it is never lost, although we may not always be able to gain access to it later on, except under unusual circumstances.

Interference theory proposed first the mechanism of *retroactive interference* to account for forgetting. This means that something learned later interferes with the retention of something learned earlier. Conceptualize a pair of words in a list of paired associates as A-B. Now think of a second list as A-C, the C meaning that a new word is to be associated with A rather than the first-list word, B. Learning of the second list, when it has this form, interferes markedly with the retention of A-B, in comparison with the case where no second list is learned or where the second list has the form C-D; i.e., both the stimulus and the response terms are different from those of the first list. These effects vary with the extent to which the stimuli and the responses of the two lists are similar. If, for example, C is a synonym of B, A-B will not be disrupted as much as when C is not related to B.

Retroactive interference has been said to result from the *unlearning* of the A-B relation, due to learning A-C, but there is now reason to think that the interference is less specific than this, involving instead a *suppression* of the entire set of first-list responses.

In any case, another factor, *proactive inhibition*, is also involved in forgetting. Ebbinghaus, you will remember, retained as little as a third of the list he had learned 24 hours earlier. Evidence from college students who learn only one list indicates retention after 24 hours closer to 80 percent. Ebbinghaus learned many lists, and it is the proactive effect of having learned all these lists that probably caused the massive forgetting he reported. The college students mentioned above were not subjected to this much proactive inhibition but, when they were, they forgot at a rate comparable to Ebbinghaus's.

Much forgetting then may be due to interference. We are still uncertain as to just how to conceive the mechanisms of this interference, but it is doubtful that the forgetting it causes is total or irreversible. We know that recognition memory is not subject to interference in the A-B, A-C design. It seems as if forgetting due to interference when we measure recall may be due to difficulty in *producing the responses,* rather than in the loss of their relations to their cues.

Cues are very important to recall, and it may be that much we think has been forgotten is still available and could be retrieved if we had the proper cues. Anecdotal evidence supports this argument, as we can all report experiences of remembering things thought forgotten when we return to a place where we once lived or see a friend whom we have not seen for a long time. There is not much experimental support for this position, but one study does support it. In this work, cues were given (or not) at the time

Answer frame 3^6

1. False. Starting with Ebbinghaus, the evidence consistently shows that retention is a function of degree of original learning, and overlearning represents a high degree of such learning.
2. False. Distribution of practice facilitates retention even when degree of learning is equated.
3. True. Active rehearsal or recitation lessens forgetting. Also being tested on the material as you read it retards forgetting. That is one important reason for programmed texts such as this one.
4. True. The utility of these methods has not been fully assessed, although there are many reports that they result in achievement which is at least as good as that accomplished by traditional methods.

If you missed any of the above, you should reread Frame 3^6 before turning to Frame 4^6 on page 41.

Frame 4^6 continued

of learning and then were re-presented (or not) at the time of recall. Memory was substantially improved when the same cue was presented at recall as had been presented earlier.

A moment ago we used the term long-term memory. Current opinion is that memory probably consists of at least three kinds of stores. One is a very *brief store,* in which the effects of stimulation persist for perhaps a second before decaying. The second is called *short-term memory* and endures for perhaps 30 seconds. Memories enduring longer than this are entered into the *long-term store.* Our memories of events seem to be more complete and veridical in the very brief store than in short-term store and in the latter than in long-term store. The short-term store has a *limited capacity* and *selection* and *coding processes* occur there before transfer to the long-term store, just as they do in the transfer to the short-term store. Some writers see decay as an important process in short-term memory but others speak not of decay but of items being "bumped out" of this store when the number entering it exceeds its capacity. The idea that there are several storage systems in memory is a new one and further work is necessary for its evaluation and for the determination of the processes that go on in it.

TRANSFER

When we spoke of proactive inhibition, our reference was to the *retention* of material the learning of which was preceded by the learning of other material. We can also speak of the effects of prior learning upon the subsequent *learning* of new material. This is the topic of *transfer of training* or of learning, and the transfer can be *positive,* i.e., the subsequent learning is facilitated, or *negative,* i.e., the subsequent learning is retarded. (And, of course, there can be no discernible effect.)

In list-learning experiments we often see marked positive transfer. For example, subjects asked to learn a new list of nonsense syllables each day for 20 days learned 40 percent more on the 20th day than they had learned on the 1st day in the same number of trials. Such evidence indicates *learning to learn;* i.e., the subject learns techniques of how to master a class of materials. Positive transfer also occurs when the subject learns rules or principles that have a wide applicability.

Transfer has its specific features, too, and two-list designs are used in studying them much like those used in studies of retroactive and proactive inhibition. Much the same findings as to interference occur. Thus, learning of A-C following A-B is more difficult than learning C-D, and similarity of stimuli and responses plays a role in the direction and amount of transfer. For example, if the responses of the second list are the same as or similar to those of the first list, there will usually be positive transfer. But when the responses differ and the stimuli of the two lists are the same, negative transfer is usually obtained, decreasing as the similarity of the responses increases. There is some negative transfer when the two lists are different (A-B, C-D), this negative transfer increasing if A and C are similar.

COMMENT

The discussion to this point has presented memory, for the most part, as a matter of recalling or recognizing specific responses. This is assuredly not the whole story. Much memory is general, even impressionistic, often involving only general ideas or the "gist" of what has been experienced, these ideas being expressed in words or sentences (in the verbal case) very different from those originally involved. One could say that a recall, for example, may be *constructed* or *reconstructed* on the basis of the general gist that is remembered. Sir Frederick Bartlett argued that memory has this character, suggesting that what is remembered is constructed from what was perceived and that what was perceived was altered to conform with a *"schema"* the subject has. The schema was the attitudes, feelings, biases, and interests that a subject has. In memory for stories, Bartlett pointed to alterations or omission of details, elaboration and normalization of others, and in general to changes making the recalled story more logical and sensible than it was originally. The field of memory is moving in the direction of Bartlett's view, highlighting such processes in memory as *abstraction, coding, decoding,* and *elaboration* rather than the rote learning of specific responses.

The learning and retention of *motor skills* is another area of study with human beings. It has included studies of tasks as diverse as telegraphy, drawing figures as reflected in mirrors, the pursuit rotor, and the complex coordinator, which requires that a stick and pedals be moved in response to changing patterns of lights. These tasks show *learning curves* that rise with practice at a diminishing rate with trials, but in some instances, telegraphy, for instance, show that performance improves beyond a certain level only when a higher order skill is mastered. Thus, in telegraphy, the receiver can do only so well if he decodes only letters, and he does not improve further until he can decode in higher units, words and then sentences. Motor skills learning is markedly improved by distributed practice, and there are actually gains following rest periods (referred to as *reminiscence*).

Study of transfer of motor skills indicates that there is much more to transfer than specific responses. For example, training with one hand in mirror drawing markedly facilitates training of the other hand. More generally, transfer is greater from one hand to the other and from one foot to the other than it is from hand to foot or the reverse on the same side; transfer between either hand to either foot or the reverse or between the two sides of the body is least. Transfer of a rotary movement from one hand to the other is best if the movement in the second hand is the opposite (e.g., from clockwise to counterclockwise). Such results do not involve identical responses but do suggest the importance of the *biological organization of the body* in transfer.

It is usually said that retention of motor skills is very good, either because they are usually much overlearned or perhaps because those studied are not subjected to much interference.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. The weight of opinion at the present time indicates that decay theory, which says that the representation of what was learned simply disappears because of metabolic events in the brain, is the most valid.

______ 2. Much forgetting may be due to retroactive interference and proactive inhibition.

______ 3. Transfer, or the effects of prior learning upon the subsequent learning of new material, is always negative.

______ 4. One trend in the study of memory comes from Bartlett's views which highlight such processes in memory as abstraction, coding, decoding, and elaboration rather than rote learning.

Now turn to Answer frame 4^6 on page 44 to check your answers.

Answer frame 4^6

1. False. Simple decay theory does not fit the evidence very well. It *may* be that once something is well learned it is never lost, although we may not be able to gain access to it later on, except under unusual circumstances.
2. True. Retroactive interference means that something learned later interferes with the retention of something learned earlier. Proactive inhibition means, for example, that the learning of many lists of material may cause a subject to forget a list learned later more easily.
3. False. Transfer can be positive, negative, or there can be no discernible effect. In list-learning experiments, there is often marked positive transfer. When the responses differ and the stimuli of two lists are the same, however, negative transfer is usually obtained.
4. True. Bartlett argued that what is remembered is constructed from what was perceived and that what was perceived was altered to conform with a "schema" or the attitudes, feelings, biases, and interests the subject has.

If you missed any of the above, you should restudy Frame 4^6. Before beginning Chapter 7, turn to page 119 and work Examination one, which covers Chapters 1-6. Chapter 7 begins on page 44.

chapter 7

THOUGHT AND LANGUAGE

FRAME 1^7

Typically, thinking is a covert activity; i.e., we do not usually think out loud or manifest thought by moving our hands and arms about. Thinking takes many forms, including daydreaming or fantasy (sometimes referred to as autistic thinking), but the forms most often investigated are a more realistic, problem-oriented sort. Thinking often occurs in the form of language, but not always. In general we can say that thinking is a symbolic activity that can proceed without direct relationship to current stimuli.

In the view of the British associationists, thinking took place in images. When this notion was put to the test by psychologists at the University of Würzburg in Germany between 1890 and 1910, it was found wanting. This is to say that these investigators could find no evidence for images in the thinking of their subjects. For example, in a word association test which requires the subject to give a word which bears some relation to another word, the response just appears. Think of an opposite to "hot." The word "cold" will come immediately, and you will probably have no images. The first result of the study of thinking, then, was the concept of *imageless thought.* The Würzburg psychologists also found something else. They showed that the *task* set for the subject importantly determines his performance; i.e., he shifts his response easily depending on what he is asked to do.

From this beginning, the study of thinking has taken several directions. *Concepts* are important to thinking, so their formation has been studied. A major interest has been taken in *problem solving* and, of course, in *reasoning. Creative thought* has come in for attention, and the processes underlying all of these manifestations of thinking have received study.

CONCEPTS

Thinking makes use of concepts; i.e., the symbols in which we think are not representative of particular things but rather tend to stand for classes of things. When we think of a triangle or a pair of pliers, for example, we usually have in mind triangles in general or pliers in general. This means that the triangle is not a particular one, having a specific size or being of a particular kind such as a right-angled triangle or one with equal sides. We really think in terms of triangularity, a concept. Similarly, when we conclude that a particular job requires a pair of pliers for its accomplishment, we are thinking of pliers in general and only when we get to the specific task do we concern ourselves with the size that we need. *Concepts then refer to classes,* the members of each class having something in common. What is in common is some property, or set of properties, or relations and may be quite abstract.

Concepts vary in *complexity.* For example, the concept of a "suit" in a deck of playing cards is fairly simple: one class includes all those cards with one or more hearts on them, and we ignore for this purpose the number of hearts and whether there are pictures on the cards or not. Such simple concepts stand in contrast to the kind known as *conjunctive* concepts, in which two or more characteristics must be present for the instances to qualify as belonging to the concept. Suppose that we have cards with varying numbers of shapes, borders, and colors on them. We can arbitrarily define instances of a concept as those cards which have both red figures and a single border. The conjunction of these two properties defines the concept; no other cards belong. *Disjunctive* concepts, on the other hand, are either-or kinds of concepts. Either cards with three colors on them or with two borders are defined as correct instances. Disjunctive concepts are more difficult to attain than are conjunctive concepts. There are also *relational* concepts. In these the common features are such notions as more figures than borders (whatever the specific number of either), or a red figure of any shape on the left side of the card if it has one border, on the right side if it has two. Such concepts can be quite difficult to attain when the relations involved are complex.

Concept attainment is said to involve the abstraction of the common property which is shared by the instances of the concept. One classical study employed lists of Chinese characters to each of which the subject was to learn a nonsense name. The common property of a set of characters was one part of the character (called a radical). The task was difficult because the radical did not stand out well from the complex character, but subjects did learn the concept and could apply it successfully to new characters that they had not seen before. Their performances were often successful before they could verbalize the concept correctly. This demonstration is a rather minimal case of simple concept formation, because the common radical was perceptually present, although difficult to discriminate. Other concept attainment tasks involve properties, combinations of properties, or relations which are not perceptually present and which must be "invented" by the subject. For example, we say that the word "animal" designates a highly abstract concept, and the acceptable instances show perhaps no perceptible properties in common. Words, by the way, are concepts, but there are concepts which we find difficult if not impossible to put in a word or words.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. There is much evidence to show that thinking takes place in images.

_______ 2. The symbols in which we think are not representative of particular things but rather tend to stand for classes of things.

_______ 3. Concepts may be simple, conjunctive, or disjunctive.

_______ 4. Concept attainment involves the abstraction of the common property which is shared by the instances of the concept.

Now turn to Answer frame 1^7 on page 48 to check your responses.

FRAME 2^7

CONCEPTS *(continued)*

Concepts can be learned laboriously by trial and error, as the subjects did in the experiment with Chinese characters, but we can also learn them through *definitions,* as we learn the meanings of words, and from *context.* In the latter case, for instance, we can often learn the meaning of a word by hearing or seeing it in sentences. When we learn concepts, our past experience may be helpful, when it tells us what to look for and gives us meanings for the objects, words, or other items which we must examine to discover the concept. But past experience can misguide us. For example, suppose that we have a large set of cards with varying numbers of pictures of different things on them. Also suppose that the concept is three of anything. This concept will be difficult to attain, because we approach this task with the idea that the similarities we seek will be in the properties of the pictures on the cards: the idea of three of anything is likely not to occur to us until we have tried many other alternatives, if it occurs to us at all.

It is often of interest to determine what a concept means to someone. One way to find this out is simply to ask for a definition, and another is to ask him to classify objects or pictures on the basis of the concepts he thinks they represent. Or we can present exemplars of a concept and ask the person to write or say all the words he can in some time interval that the exemplars make him think of. This is a *word-association* procedure. A technique called the *semantic differential* is derived from the word-association procedure but in it the subject is asked to rate a concept on a number of dimensions defined by adjectives having opposite meanings (e.g., hot-cold, hard-soft, good-bad). Statistical analyses of ratings of this sort reveal that some but not all of the meaning of concepts can be represented by values on three dimensions: evaluation, potency, and activity.

PROBLEM-SOLVING

The solution of *puzzles,* of both the mechanical and verbal kinds, exemplifies what is meant by problem solving. Such solutions may appear gradually, after substantial amounts of *trial and error,* or *suddenly.* In the latter case, we experience the phenomenon of *insight,* a sudden reorganization of our view of the problem situation, in which the interrelationships of the parts of the problem necessary to its solution become clear. Whether solutions are achieved by trial and error or by insight is probably mainly a function of the character of the problem. A maze, for example, in which the interrelations of the parts are not easy to see, tends to be solved by trial and error. Where the whole situation is in view, insight is likely to occur. As examples of the latter, we can mention that chimpanzees have been found to solve problems by using sticks as tools or by stacking boxes to obtain a banana attached to the top of the cage. All aspects of the situation are open to view in these cases, and the solutions occur suddenly and smoothly, although their occurrence is often preceded by unsuccessful attempts and by periods of seeming contemplation of the situation.

In the study of problem solving, a major orientation has been to examine the *factors that impede solution.* Among these are *sets* and *biases* to attack problems in unproductive ways. Suppose, for example, that the problem is to tie two strings together. They are suspended from the ceiling and can be tied together, but they are too short, given their separation horizontally, for one to hold one string while reaching out for the other with the unaided hand. Several solutions are possible, but one that has seemed creative is the "pendulum solution," in which one string is made to swing like a pendulum. One then holds one string and waits for the swinging string to come close so that he can grasp it.

To make a pendulum one needs a heavy weight, and the subject's success will depend on his ability to perceive that one (or more) of a set of available objects which has this property. If one of the objects is a pair of pliers, the subject can use it for this purpose, because pliers are heavy. But many subjects do not readily see pliers as having this property, because pliers have other functions which are more common. Pliers have *fixed functions,* and these functions get in the way of the realization that their weight is a key to the solution of the two-string problem. There is abundant evidence that *fixed functions, habitual solutions,* and other biasing factors can "blind" the problem solver to ways of solving problems, which, when they are pointed out to him or when he does discover them, seem simple and obvious and make him feel foolish for not having discovered them at once.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Concepts can only be learned through trial and error.

______ 2. One may determine what the concept of something means to a person through various tests.

______ 3. Insight involves a sudden reorganization of our view of the problem situation in which the interrelationships of the parts of the problem necessary to its solution become clear.

______ 4. There is much evidence that fixed functions, habitual solutions, and other factors are great aids to problem solving.

Now turn to Answer frame 2^7 on page 48 to check your answers.

FRAME 3^7

CREATIVE THINKING AND REASONING

Creative thinking involves the overcoming of such obstacles in cases where the *solutions are novel* and, typically, *socially desirable or useful.* Creativity does not seem to be closely related to intelligence, as measured by tests, but has often been described as involving several steps or stages. These stages are abstracted from accounts of their work by creative thinkers, like mathematicians and artists. First, there is a *stage of preparation,* in which the thinker becomes thoroughly familiar with the problem, acquires relevant facts and principles, and formulates hypotheses. Then there is a *stage of incubation.* The problem is put aside, unsolved, for a time. In the third stage, *illumination* occurs; i.e., the thinker suddenly realizes how the problem, about which he has not been consciously thinking during the period of incubation, can be solved. Then, fourth, *the worth of the solution* must be verified, and it can, of course, fail the test of verification. *Revisions,* the fifth stage, must often be made but, of course, the thinker may have to start over if his "solution" cannot work even with revision. During incubation, apparently, processes go on which enable the thinker to see the problem in a new light, apparently an essential step in finding the solution.

Thinking, as we have seen, is a general term. *Reasoning* is more specific, usually being restricted to thinking which follows logic, as not all thinking does. *Logical reasoning* is epitomized in the syllogism, in which a conclusion is reached from consideration of certain premises which are given. Syllogistic reasoning is, however, subject to error. For example, we may accept a false conclusion, because both it

Answer frame 1^7

1. False. Würzburg psychologists found no evidence for images in the thinking of their subjects. They also found that the task set for the subject importantly determines his performance.
2. True. Thinking makes use of concepts. Concepts refer to classes, the members of each class having something in common. What is common is some property, or set of properties, or relations and may be quite abstract.
3. True. A simple concept may involve one characteristic, such as color. Conjunctive concepts call for two or more characteristics. Disjunctive concepts are either-or kinds of concepts and are more difficult to attain than conjunctive concepts.
4. True. Some concepts are attained before the concept can be verbalized because the common property is so abstract.

If you missed any of the above, you should restudy Frame 1^7 before turning to Frame 2^7 on page 46.

Frame 2^7 continued

Answer frame 2^7

1. False. Concepts can be learned by trial and error, but they can also be learned through definitions, as we learn the meanings of words, and from context.
2. True. One way is to simply ask for a definition. Another way is to give exemplars of a concept and ask the person to write all of the words he can think of having to do with the exemplar. Using the semantic differential, the person rates the concept on a number of dimensions defined by adjectives with opposite meanings.
3. True. Problems may be solved through trial and error, but when all aspects of the situation are open to view, the solution may occur suddenly and smoothly through *insight*.
4. False. The evidence shows that fixed functions and other biasing factors can "blind" the problem solver to ways of solving problems.

If you missed any of the above, you should reread Frame 2^7 before turning to Frame 3^7 on page 47.

Frame 3^7 continued

and the premises are stated affirmatively. This is known as the *atmosphere effect*. Similarly, the logic of the syllogism may fail because premises are wrong, perhaps because they or their combination are reflections of opinions, beliefs, or attitudes which are not valid. Sometimes we can contrive premises from which we can "deduce" a conclusion which we have determined that we shall reach. *Emotional factors*, such as those that are involved in many political issues, can have this consequence.

THE THINKING PROCESS

We said earlier that thinking is a covert process. There has been a good deal of interest in finding out what goes on during thinking. Some people report that they use imagery in thinking, though others do not. This seems to be an area of difference among individuals. Two other hypotheses about what thinking consists of have received extensive attention:

Muscular movements. One of them is that thinking involves *minute muscular movements* in the speech musculature or elsewhere. The evidence indicates that such movements do often accompany thinking but that they are not essential to thought. Some investigators have made electrical recordings of tiny movements in muscles during thought and imaging. One, for example, recorded from the fingers of deaf mutes, who "speak" with their fingers (sign language). He found evidence for implicit movements during problem solution and dreaming in these subjects, and other studies with hearing and speaking subjects have shown that there are minimal movements of muscles in that arm which the subject imagines is lifting a heavy object, such as a suitcase. Thinking, then, can be accompanied by covert muscular responses. However, one particularly heroic subject allowed himself to be given curare to the extent that he was paralyzed. He could no longer hold his eyes open and artificial respiration was necessary to his breathing. Nevertheless, he still reported, afterward, that he had thoughts, could solve problems, and suffered no limitations on his ability to perceive and think.

Language. It has also been suggested that thinking depends on *language.* Evidence for thought in animals, in very young children, and in cases of inability to speak from a very early age clearly controvert this suggestion. This is not to say, however, that thinking cannot be a lot easier and more effective when it can be put into verbal terms than when not. However, strong claims that the thoughts and concepts of peoples whose languages are very different must necessarily also be very different do not receive support from contemporary linguistics, the science which studies languages.

Claims about the role of language in thought are often made in ignorance of the complex matter that language is. It is clear now that *language is a highly complex, rule-governed process* and that its treatment in terms of words or semantics alone neglects many of its most interesting properties. Psycholinguists, who study the processes involved in the use of language, now seem to agree that language must be analyzed at several levels. We cannot go into this subject fully here but can point out a distinction between two levels and some of the implications this distinction has. We can distinguish between the *surface structure* of a sentence, i.e., what we read or hear, and an underlying or *deep structure* which is important to understanding the sentence. For example, the following two sentences have different surface structures but must have the same deep structures, because they mean essentially the same thing: "The boy hit the ball" and "The ball was hit by the boy." What is important to understanding such sentences is to discern which noun is the actor in the sentence and which designates what is acted on. Clearly, "the boy" is the actor in both, despite its different position in the two sentences, and the deep structure represents this fact, which is not obvious from the surface structure. Similarly, one can have very similar surface structures, even though the underlying structures are different. Consider the two sentences, "John is interesting to observe" and "John is willing to observe." One can see that these sentences differ, because one can accept a paraphrase of the first one, "Observing John is interesting," which one cannot accept for the second one, "Observing John is willing." In the underlying structure of the first sentence, John is the object of someone's observation, whereas in the second sentence it is John who makes the observation; i.e., John is the actor. Evidence such as this supports the distinction between deep and surface structures in the analysis of sentences and poses major problems for the psycholinguist, who would attempt to characterize the kinds of knowledge that speakers have which enables them to see these paraphrase relations easily. The nature of language, as revealed by linguistics, has many implications for the study of thinking and for the role of language in thought.

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Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Creativity is closely related to intelligence as measured by tests.

______ 2. All thinking involves logic as epitomized in the syllogism.

______ 3. Thinking depends on language so that thoughts may be developed into sentences.

______ 4. Minute muscular movements in the speech musculature or elsewhere are essential to the thinking process.

Now turn to Answer frame 3⁷ on page 52 to check your answers.

chapter 8

SENSORY PROCESSES

FRAME 1⁸

Our knowledge of the external world comes through the senses, and it is important to the study of behavior that we have some knowledge of what the senses are, how they work and are stimulated, and what some of their limitations and coding functions are. The senses respond to stimulation, but not to all stimulation, and they transform the stimuli to which they do respond.

We often speak of 5 senses but, in fact, there are at least 10, as we shall see. There are certain principles and methods that are applicable to all of them, and we review these before going to the specific senses themselves.

PSYCHOPHYSICS

There are energies which we can detect, which we call stimuli, and there are others that we cannot detect. For example, some of us, at least, can detect sounds varying in pitch from very low to very high; but there are higher pitches which we cannot hear, even though dogs and bats can. Electromagnetic waves range from gamma and X-rays to radio waves and the alternating current of a house circuit. We can, however, detect through sight only a tiny portion of such waves, those in the *visible spectrum* which produce the color qualities from violet and blue to orange and red. There is a lot going on in the environment that we cannot sense. Further, there are differences among stimuli which are too small for us to detect, whereas other, larger differences are obvious to the sense involved.

The methods of *psychophysics* are applicable to these points. By presenting stimuli such as pure tones under controlled conditions, we can establish the lowest and the highest frequencies an individual can hear as tones. These are methods for measuring *absolute thresholds* or *limens.* Further, we can present two tones and ask the observer whether they are the same or different. Such a method yields a *difference threshold,* indicating the *discrimination* of which we are capable within that sense, or its acuity. There are a number of psychophysical methods and a number of technical problems in establishing these thresholds but we cannot discuss them here.

In the case of most of the senses, there are specialized organs, called *receptors,* which respond primarily to a given kind of stimulation, the *adequate stimuli.* Thus, the receptive cells in the eye react to light, the adequate stimuli, though pressure on the eyeball can result in visual sensations.

The sensory energy is detected by the receptor, and in the range of adequate stimuli and under good conditions the sensitivity of receptors is very great. For example, we can detect the tick of a watch at 20 feet or a drop of perfume diffused into an amount of air equal to that in a three-room apartment. Receptors develop an energy, known as the *generator potential,* which may trigger an impulse in the neurons which supply it. The basis of our sensory experience is this neural activity, so that we experience the world only indirectly.

In general, our experience of the intensity of our sensations is related to the intensity of stimulation, but not linearly. For example, our experience of the brightness of a visual stimulus increases slowly at first and then more rapidly as the intensity of the light rises. Present opinion seems to be that the intensity of a subjective experience increases with the physical intensity of the stimulus multiplied by a constant and raised to a power. This relation is known as the *power law.*

There is also a law concerning the difference threshold. If we add the light of one candle to that provided by one other candle in an otherwise dark room, we readily perceive the difference. However, if there are 1,000 candles in the room, the addition of one more will not yield a perceptible difference. It would probably require the addition of 16 or 17 candles to make a difference in this case. The law involved is *Weber's law* which states that to yield a difference that is perceptible, the additional stimulation needed is a constant fraction of that already present. This law holds well within the middle values of sensory continua but breaks down at the extremes.

Sensory adaptation also occurs over many of the senses. This means that we respond less to a stimulus after a time than we do initially. Thus the sunlight will seem very bright just after we leave a motion-picture theater in the afternoon, but we soon *"adapt,"* just as we adapt to the dimness of the theater when we first enter it.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. Man is able to respond to all stimuli through his senses.

_______ 2. There are a number of psychophysical methods which can be used to measure man's thresholds or limens.

_______ 3. With most of the senses, there are specialized organs, called receptors, which respond primarily to a given kind of stimulation, the adequate stimuli.

_______ 4. In general, there is a linear relationship between the intensity of a stimulation and the intensity of our sensations.

_______ 5. Weber's law states that to yield a difference that is perceptible, the additional stimulation needed is a constant fraction of that already present.

Now turn to Answer frame 1^8 on page 52 to check your responses.

Answer frame 3⁷

1. False. Creativity does not seem to be related closely to intelligence, but has often been described as involving steps or stages.
2. False. Not all thinking involves logic, and thinking which follows logic is known as reasoning.
3. False. Evidence for thought in animals, in very young children, and in cases of inability to speak from a very early age controverts the idea that thinking depends on language.
4. False. The evidence indicates that such movements do often accompany thinking, but they are not essential to thought.

If you missed any of the above, you should restudy Frame 3⁷ before beginning Chapter 8 on page 50.

Answer frame 1⁸

1. False. There are energies which we can detect, called stimuli, and there are others we cannot detect.
2. True. By presenting stimuli such as pure tones under controlled conditions, psychophysics can establish the lowest and highest frequencies an individual can hear as tones.
3. True. Sensory energy is detected by the receptor, and in the range of adequate stimuli and under good conditions the sensitivity of receptors is very great.
4. False. Present opinion seems to be that the intensity of a subjective experience increases with the physical intensity of the stimulus *multiplied by a constant and raised to a power.* This is known as the power law.
5. True. This law holds well within the middle values of sensory continua but breaks down at the extremes.

If you missed any of the above, you should restudy Frame 1⁸ before beginning Frame 2⁸ below.

FRAME 2⁸

VISION

As already mentioned, visual stimuli are *electromagnetic waves* from a very narrow range of all such waves. The frequencies of these waves are customarily measured in billionths of a meter, called *nanometers,* or nm. The visual spectrum ranges from just under *400 nm.* to just over *700 nm.* The *white light* of sunlight is actually a *mixture of frequencies,* as Isaac Newton demonstrated in the 17th century by arranging for white light to pass through a prism. The prism spreads out the rays of different frequencies, so that we can see the colors of the spectrum.

The visual stimulus yields three properties, *hue or color, brightness,* and *saturation.* The first is dependent mainly on the wavelength (in nm.) and yields violet and blue for the short waves (400 nm.) and red at the long end (700 nm.). Saturation refers to the purity of the colors; i.e., how much a color is diluted by whiteness or grayness. For example, a yellow at 580 nm. and a blue at 480 nm. are, alone, highly saturated colors. Mixing them, however, in certain proportions reduces the saturation of each one; since these lights are complementary colors, mixing them in the correct proportions produces a gray. Other proportions will produce unsaturated yellows and blues. Similar effects are obtained when red and green, also complementary colors, are mixed. In general, *mixture of colors* can produce a variety of other colors and saturation effects. (It should be noted that we here speak of mixing lights; mixtures of paints are based on different principles and produce different results.) *Brightness* comes mainly from the intensity of the stimulus and is perceived at high intensity as white, at low as black, with various grays in between.

These dimensions can be summarized in a *color "solid."* There is first a circular plane, around the edges of which are represented the frequencies of the visible spectrum. Saturation is represented along the radius of this circle, with low saturation at the center of the circle and high saturation at the perimeter. Brightness is represented by the third dimension, perpendicular to the plane and passing through its center; white is represented at one end and black at the other, and the grays are in between.

Not all people see all the hues of the spectrum, as some people are *color-blind.* A rare condition is *total color blindness,* in which none of the colors can be differentiated. Such people are called *monochromats.* In others we have *red-green blindness,* more common in men (5 to 7 percent) than in women (1 percent), and (very rarely) *yellow-blue blindness.* These people are called *dichromats.*

There are many phenomena of color, only two of which can be mentioned here. One is *afterimages;* one continues to see a color after the stimulus is removed. The afterimage is often in the color complementary to the one that was inspected *(negative afterimage).* Thus, if one looks for a time at a patch of red, the afterimage will be green. There are also *contrast effects.* For example, a gray area surrounded by a colored one will take on the hue of the color complementary to the one that surrounds it.

The evidence from color mixture indicates that all colors of the visible spectrum can be obtained by suitable mixtures of just three wavelengths, those corresponding to red, green, and blue. This fact has led to theories of color vision, but before turning to them we should discuss at least briefly the anatomy of the visual system.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Visual stimuli are electromagnetic waves whose frequencies are customarily measured in billionths of a meter, called nanometers.

______ 2. The visual stimulus yields three properties: hue or color, brightness, and saturation.

______ 3. About 5 to 7 percent of all men are totally color-blind.

______ 4. The evidence from color mixture indicates that all the colors of the visual spectrum can be obtained by suitable mixtures of just three wavelengths: red, green, and yellow.

Now turn to Answer frame 2^8 on page 54 to check your answers.

FRAME 3^8

The visual system of man. Light passes into the eye through the *cornea,* via an opening behind it, called the *pupil.* The pupil is surrounded by the colored part of the eye, the *iris,* which controls the size of the pupil; the pupil dilates in dim illumination, contracts in bright light. Immediately behind the pupil is the *lens,* which focuses the light on the *retina,* at the back of the eye, and which changes its shape *(accommodation)* in accordance with the distance of the object being fixated from the eye. The lens is flat for distant objects and bulges to focus on near objects. The latter function is limited by a loss of flexibility in the lens in the later years, producing the condition known as *presbyopia,* which is corrected by bifocal glasses. The retina contains the actual light sensitive cells, the *rods and the cones.* These cells are distributed differently in the retina, the cones being most numerous in a region called the *fovea,* the rods outside the fovea. There is good reason to believe that the cones function mainly in bright light and in the perception of color; the rods operate in dim illumination. The functions of the two receptors can be seen in a *dark-adaption curve,* which plots the increase in sensitivity as a function

Answer frame 2⁸

1. True. The visual spectrum ranges from just under 400 nm. to just over 700 nm. (nanometers).
2. True. Color depends mainly on wavelength with violet and blue for short waves and red at the long end. Saturation refers to purity or how much the color is diluted by whiteness or grayness. Brightness comes mainly from the intensity of the stimulus (high intensity equals white, low equals black, and gray is in the middle).
3. False. Total color blindness, in which none of the colors can be differentiated, is a rare condition. Five to seven percent of men have red-green blindness, while only 1 percent of women have it. These people are called dichromats.
4. False. All of the colors can be obtained through three wavelengths, but they are *red, green,* and *blue.*

If you missed any of the above, you should reread Frame 2⁸ before turning to Frame 3⁸ on page 53.

Frame 3⁸ continued

of time in the dark. The curve shows two parts, one being of short duration and showing only a small change in sensitivity, the cone part, the other requiring more time and leading to a large change in sensitivity (the rod part). The vision the rods permit is colorless, whereas the cones mediate both colorless and color vision. Chemical activity induced by light in these cells stimulates neural activity which passes into the optic nerve and through nuclei in the lateral geniculate body and other centers before reaching the visual cortex. In their passage, fibers carrying impulses from the nasal side of the eyes cross over, at the optic chiasma, to the opposite side of the brain; impulses from the temporal side of the eye go to the cortex on the same side.

It is now known that there are *three kinds of cones,* which are maximally sensitive to wavelengths corresponding to *blue, green,* and *yellow,* with some sensitivity to red in the last type. *The Young-Helmholtz theory* of color vision, proposed at different times in the 19th century by these investigators, had attempted to explain color vision by postulating three kinds of cones (sensitive to red, blue, and green) which in combination could give the other colors. There is thus some support, though it is not exact, for this theory. Another theory, proposed by *Hering,* however, postulated three kinds of cones, also, but suggested that one yielded black-white, one red-green, and one blue-yellow. Hering's theory survives in the *opponent-process theory.* This conception assumes that the opposite processes which in each dimension produce one of the two colors occur in the optic system above the retina. Measurements made at the lateral geniculate body are consistent with this view.

It now appears that the Young-Helmholtz theory is supported when we consider retinal events, but that the modern version of Hering's theory is correct, too, when we look at processes in the visual system beyond the retina. It remains to be seen, of course, what the ultimate account of color vision will be. It may differ entirely from these two theories.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Light passes into the eye through the lens into the cornea.

______ 2. Presbyopia, which is corrected by bifocal glasses, is caused by a loss of flexibility in the lens usually in the later years of life.

______ 3. The light sensitive cells of the eye are located in the retina and are called rods and cones.

______ 4. Researchers have established definitely that color vision results from three kinds of cones.

Now turn to Answer frame 3⁸ on page 56 to check your answers.

FRAME 4[8]

HEARING

The stimulus for hearing (or *audition*) is a *sound wave,* made by the vibration of an object in the air. Such vibrations compress the molecules of the air when they move in one direction, creating a partial vacuum when they move the other way. The vibrations vary in *frequency* and also in size or *amplitude.* Frequency is expressed in *number of vibrations, called Hertz* (Hz.), and *intensity* as the amount of *pressure* the wave exerts. There is a range of pressures in the sounds we hear, such that the pressure of the most intense sound is 1,000,000 times as great as that of the weakest sound. A logarithmic scale, expressed in *decibels* (db.), is used to represent these pressures; a normal conversation is at from 50 to 70 db., the noise of a subway train at from 100 to 110, and that of loud thunder at about 115 db. Above this range, the intensity of sounds is painful.

Sound waves, unless they are *pure tones* (sine waves), are *complex.* They consist of a *fundamental tone* or pitch plus a number of *harmonics,* which are multiples of the fundamental frequency. The differences among musical instruments (their *timbre*), for example, arise from the different sorts of complex waves they engender. *Noise,* on the other hand, is a complex wave in which various frequencies are randomly combined.

The *pitch* of a sound is given primarily by its *frequency,* but intensity contributes to it, too. The *loudness* of a sound is related to its *intensity,* as we have said, although in this case as with pitch the psychological experience of loudness is not linearly related to intensity. In man, the *range of audible frequencies* is between 20 and 20,000 Hz., more than the range of notes on a piano. However, many people cannot hear the very high frequencies, as with age there is a loss of sensitivity to them. Hearing is best, in general, for tones in the range from about 500 to 4,000 Hz. Much greater intensity is required to hear tones outside this range than to hear tones inside it. There are other attributes of tones, such as brightness, density, volume, and chroma, which have on occasion been reliably evaluated after training, but they are not correlated in any simple way with the basic dimensions of the auditory stimulus.

Sound enters the external ear and is transmitted through the *auditory canal* (meatus) to the *ear drum,* a membrane, whose vibrations are carried to the *inner ear* across three small bones *(the ossicles)* in the middle ear. The last of these bones, the *stapes,* moves another membrane, the *oval window,* and the motions are transferred to the fluid contained in the *cochlea,* a bony structure which is spiral-shaped like a snail. This structure contains three canals, which spiral together, and are separated by membranes. The pressure waves in the fluid occur first in one of these canals, the *vestibular canal,* and then pass across the *cochlear canal* and the *basilar membrane,* to the *tympanic canal;* this last canal terminates in another membrane, the *round window,* which moves in response to the transmitted pressure waves.

The sensitive cells for hearing are contained in the *Organs of Corti* located on the basilar membrane. This organ contains *hair cells* which are activated by the pressure waves transmitted across the membrane, and their activity sets up nerve impulses in the neurons of the *auditory nerve.*

Two theories of hearing have been proposed, the *place theory* and the *frequency or telephone theory.* The first holds that pitch depends on the place on the basilar membrane which is set into maximal motion by the pressure waves. The second simply holds that the frequency of the sound wave is transmitted to the auditory nerve via the receptor cells. One solution of the problem offered by these competing theories is to accept both, partially. Place of stimulation seems to hold for frequencies above around 4,000 Hz., but there are difficulties with this theory for lower frequencies. Perhaps the lower frequencies are transmitted as such, and the auditory nerve does track frequencies up to this level. However, the frequency theory has to be supplemented by a *volley principle,* since the refractory periods of neurones would prevent their firing at rates above 1,000 Hz. The volley notion supposes that the neurones act like squads, only some of which participate at one time and, while they are in refractory phase, others take up the action. This combination of principles is not as elegant as a single principle would be, and at least one outstanding investigator (Von Békésy) believes that a unitary place theory may still be possible.

Answer frame 3^8

1. False. Light passes through the cornea via an opening behind it called the pupil. The pupil is surrounded by the colored iris which controls the size of the pupil. The lens is behind the pupil and focuses light on the retina.
2. True. The lens, which focuses the light on the retina, at the back of the eye, changes its shape (accommodation) in accordance with the distance of the object being fixated from the eye. When the lens no longer flattens for distant objects and bulges for near objects, bifocals are needed.
3. True. There is good reason to believe that the cones function mainly in bright light and in the perception of color; the rods operate in dim illumination.
4. False. Two *theories* have received some support. The Young-Helmholtz theory postulates three kinds of cones—red, blue, and green—and is supported when we consider retinal events. Hering postulates three cones also: one yields black-white, one red-green, and the other blue-yellow. Hering's theory is correct, too, when we look at processes in the visual system beyond the retina.

If you missed any of the above, you should review Frame 3^8 before turning to Frame 4^8 on page 55.

Frame 4^8 continued

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. The stimulus for hearing is a sound wave made by vibrations of an object in the air which compress the molecules of the air when they move in one direction and create a partial vacuum when they move the other way.

______ 2. The pressure of sounds is expressed in decibels.

______ 3. Sound enters the external ear and is transmitted through the auditory canal (meatus) to the eardrum, a membrane. Vibrations of this membrane are carried to the inner ear across three small bones (the ossicles) in the middle ear.

______ 4. Scientists feel they completely understand how hearing takes place.

Now turn to Answer frame 4^8 on page 58 to check your answers.

FRAME 5^8

THE SKIN SENSES

Careful exploration of the skin reveals that it is not uniformly sensitive but rather has *sensitive spots.* Furthermore, no one spot, when stimulated, gives rise to the experiences of *touch* (pressure), *warmth, cold,* and *pain,* the four qualities we sense from stimulation of the skin. It is necessary, then, to conclude that there are *four skin senses.* There are a number of structures in the skin which may serve as the receptors for these qualities, and there are also free nerve endings and nerve endings at the bases of hairs. It is not clear at present which of these arrangements is consistently associated with each of the skin senses.

The pressure or *touch thresholds* vary widely over the skin, the tip of the tongue and of the fingers being very sensitive, the sole of the foot being much less so. Similar differences appear for the *two-point* *threshold,* the distance between two-touch stimuli at which the person can perceive two points of pressure. The lips have a low two-point threshold, whereas that for the leg is high. *Pain* is aroused by any very intense stimulus applied to the skin and by tissue injury, and the experience of pain is subject to variations induced by suggestion, concurrent auditory stimulation, and by hypnosis. There are people who are congenitally insensitive to pain and who, as a result, bear scars of injuries caused because they did not sense the pain of injurious stimuli.

The stimulus for *warmth* and *cold* is provided by objects whose temperature deviates (in either direction) from that of the skin. There are more cold than warm spots, and they are closer to the surface of the skin than are the warm spots. Again there are wide differences in the sensitivities to these stimuli over the body, the lips, for example, having many cold spots and no warm spots. One phenomenon, the *perception of heat,* is apparently dependent on the stimulation of both cold and warmth receptors; the cold receptors respond to high temperatures as well as to low ones, and when stimulated precisely yield the experience of cold *(paradoxical cold)* even when the stimulus is high in temperature.

THE CHEMICAL SENSES

Smell and *taste* belong here. The receptors for smell lie deep in the nasal cavity and are supplemented by hairs at their ends. They are stimulated by gaseous molecules, but the exact mechanism of this stimulation is uncertain. A current view is that molecular shape is important in that to pass a particular receptor cell the gaseous molecule must have the shape that suits the shape of an opening in the receptor. This theory is promising but requires further work to be accepted. There is some belief that there are some basic or *primary odors,* with others being due to mixtures. One view lists seven primary odors (like camphor, musky, floral, minty, ethereal (like ether), pungent, and putrid). However, fewer primaries have been suggested.

The sensitive cells for taste are located in *taste buds,* in the ridges or papillae of the tongue. There are *four tastes*—sweet, sour, salty, bitter—and the variety of tastes we ordinarily experience are due to a large contribution from the sense of smell. (Food, you will recall, is "tasteless," when we have a cold which interferes with smell). Of course, many foods also stimulate more than one quality at the same time. The four primary tastes are distributed unevenly over the tongue, sweet being at the tip, bitter at the back, and sour and salty at the sides.

OTHER SENSES

Kinesthesis is a sense important to effective movement, but we are usually not much aware of it except when it is damaged. In such cases, coordinated movement is difficult. The receptors are located in the muscles and joints and are stimulated by movement of these structures.

The *vestibular system* is located in the inner ear near to but separate from the cochlea. It provides information about the position of the head and body and of their movements through space, such as rotation. Again we are seldom aware of this system save when it is damaged; balance then becomes difficult. The structures in which the receptors are located are the three semicircular canals and the vestibular sacs. When we are dizzy or when we experience sea- or airsickness it is the excessive stimulation of the vestibular system which is responsible.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. The skin is not uniformly sensitive but has sensitive spots.

______ 2. The receptors for smell lie deep in the nasal cavity and are supplemented by hairs at their ends.

______ 3. The sensitive cells for taste that are located in the tongue are the only source of taste experience we have.

______ 4. When we are dizzy or when we experience sea- or airsickness, it is due to an overagitation of the stomach.

Now turn to Answer frame 5^8 on page 58 to check your answers.

Answer frame 4^8

1. True. The vibrations vary in frequency and in amplitude; frequency is expressed in the number of vibrations, called Hertz, and intensity, as the amount of pressure the wave exerts.
2. True. A logarithmic scale, expressed in decibels (db.), is used to represent sound pressures. Above the range of 115 db. the intensity of sound is painful.
3. True. The last of the three bones, the stapes, moves another membrane and the motions are transferred to a fluid in the cochlea which has three canals separated by membranes. The pressure waves in the fluid go through the canals and terminate in another membrane which again activates other cells which eventually affect the auditory nerve.
4. False. Two *theories* of hearing have been proposed, the place theory and the frequency or telephone theory. One solution of the problem offered by these two competing theories is to accept both partially. Investigators are still looking for a unitary place theory.

If you missed any of the above, you should restudy Frame 4^8 before turning to Frame 5^8 on page 56.

Answer frame 5^8

1. True. No one spot, when stimulated, gives rise to the experience of pressure, warmth, cold, or pain; therefore, it is concluded that there are four skin senses.
2. True. They are stimulated by gaseous molecules, but how this occurs is still uncertain.
3. False. There are four tastes–sweet, sour, salty, and bitter–and the variety of tastes we ordinarily experience is due to a large contribution from the sense of smell.
4. False. Dizziness is caused by the excessive stimulation of the vestibular system in the inner ear.

If you missed any of the above, you should review Frame 5^8 before beginning Chapter 9 on page 59.

chapter 9

PERCEPTION

FRAME 1^9

The processes we discussed in the last chapter are basic to our experience of the world, but, of themselves, do not account for the ways in which we experience that world. We are aware of much more than brightness and color, pressure, temperatures, sounds at threshold level, and the like. Rather we see and feel objects, hear melodies, understand speech, and so on. In a word we *perceive* as well as sense the environment; and perception is an integration, in the brain, of sensory information. In this integration, it is often the case that direct relations of experience to sensory events are lost and even that perception sometimes seems to belie the events which go on in the receptors.

PERCEPTUAL ORGANIZATION

Perhaps the first thing to say about perception is that it is *organized.* For one thing, there is always an organization in which a *figure* and a *background* appear. This is always true, except under some experimental conditions in which the observer is placed in an homogeneous environment or field. But, typically, we see (most of our discussion in this chapter deals with visual perception) figures against a background; i.e., we distinguish figure from ground. The *contour* or *border* of a figure is central to this distinction, as when the border is blurred the figure may disappear after a period of viewing it. Likewise, if a figure is embedded in another one, so that its borders are difficult to discern, the figure will be difficult to see.

There are some figures in which one part is seen as figure some of the time and as ground at other times. A suitably shaped vase, in white against a black background, for example, may give way to two facing profiles in black, with white as the ground. There are other *reversible figures,* involving *reversible perspective.* For example, an outline drawing of a staircase may be seen as if from above but then may reverse so that it appears as from below.

Contours seem to arise when there is an abrupt change in stimulation, as there is at the edges of a black square on a white background. Yet there are cases in which contours are seen without this situation. For example, *Mach bands* appear. These bands are both a dark line and a light line which arise as we look at a figure in which from one end to the other there is a fairly abrupt change in the intensity of light. We see the lines where the change in light is most abrupt, even though there is no actual correspondence in the physical stimulus to these lines. Mach bands are a complex matter, and they are mentioned here merely to indicate that contour, also, is a complex problem, as contours do not always depend on physical stimulation.

The organization of the visual field was emphasized by the Gestalt psychologists and they described a number of principles of perceptual organization. One principle was that of *proximity.* If there are a number of figures in the visual field, we group those together that are nearest to one another. Similarly, we group figures that are *similar* to one another in some way. We see a curve as continuing or going on in its pattern, or a straight line as continuing so, both illustrating the principle of *good continuation.* We also tend to see symmetrical figures more easily than asymmetrical figures, the principle of *good* figure. Parts of a figure that move together are seen as organized into a figure, the principle of *common* *fate.* A limited time for inspection often results in our perceiving a whole figure, a circle, or a square, despite gaps in the boundary. We obey the principle of *closure* when we see the figure as complete.

Some of the principles can be found easily in other sense modalities than vision. Thus, we hear the melody against the background of the accompaniment, an illustration of the figure-ground distinction in hearing. Rhythm, in music, probably depends on proximity in time and grouping on accent, as when the conductor says, "ONE, two, three, four, ONE. . . ." Grouping can be illustrated in touch. Touch two places on the skin in quick succession and then a third after a short delay. The first two points will seem nearer to one another than they seem to the third, despite the fact that the three points are actually equally separated on the skin.

A further illustration of the influence of organization on perception is provided by the *geometric illusions.* These are visual displays which we see as different from what would be expected from the actual physical measurements. For example, in the Müller-Lyer illusion, two lines of equal length are seen as unequal; the effect is produced by placing, at both ends of the lines, short lines which, in one line, are drawn toward the main line and, in the other, are drawn going away from the main line. The latter line is seen as longer than the former. There are many geometrical illusions, and they have in common that some distortion is introduced in a line or other figure because of the context in which it appears. These illusions illustrate that perception of a figure, including a line, is influenced by the *context* in which that line appears.

There are other manifestations of context. One example is provided by the notion of *Adaptation Level* (AL). Suppose that we are asked to judge weights on the dimension from light to heavy. If the weights range from 20 to 70 grams we will, of course, judge the 70 gram weight as heavy. But in another series, the weights may range from 70 to 120 grams; in this case the 70 gram weight is judged as light. This simple example indicates an important point: judgments occur in the context of a framework or an AL. A 90 db. tone seems loud in a quiet church but it would not seem so in a busy jet airport.

Figural aftereffects also exemplify the influence of context. For example if one fixates an X so that a solid rectangle stimulates the eye and then looks at the X in another figure which contains four squares, the two lower squares seem farther apart than the two upper squares. This is true if one of the new lower squares stimulates the same area of the eye as was stimulated by the rectangle in the preceding figure. There are a number of examples of figural aftereffects and they have in common the phenomenon that the present perception is influenced by the prior experience.

Perceptual constancy. Ordinarily the perceptual world is fairly stable. Thus, a piece of white paper, seen in shadow, still seems to be white, a person's head when he is 20 feet away looks to be the same size it does when he is 3 feet away, a dinner plate still seems circular, even though we regard it from an angle rather than from above. These examples illustrate perceptual constancy. The reader may not have thought about it, but perceptual constancy reveals that we do not always see things "as they are."

Take size, for example. The visual angle and the size of the retinal image are much smaller at 20 feet than they are at 3 feet, but so long as we have cues to distance available to us we see the head as the same size at both distances. But if we bracket the area taken up by the head at both distances with the thumb and forefinger we readily see the difference. Likewise, if we look at the piece of paper in shadow under conditions which hide the general conditions of illumination it will look dark. And the retinal image of the dinner plate, from an angle, is surely noncircular. The perceptual constancies—*size, shape, color, brightness*—occur under normal conditions of viewing, i.e., when we can see the context (distance, illumination, and so on) in which objects appear. The constancies provide a world of stable objects and no doubt have great value as a result in enabling us to deal with the world. Interestingly enough, artists who wish to paint objects so that they will look normal must often paint them more nearly as they are in retinal terms, so that the viewer, on whom the constancies will work, will see them as they normally appear.

The retina which contains the sensitive cells for vision is a two-dimensional structure. Yet, our perceptions of the world occur in three dimensions. Much interest attends the question of how we perceive depth, and a number of cues have been identified which enable us to see depth. Some of the cues involve both eyes *(binocular),* while one eye is sufficient to use the others *(monocular).*

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. Perception is an integration, in the brain, of sensory information which may distort the actual event.

_______ 2. Gestalt psychologists emphasized the organization of the visual field and described a number of principles of perceptual organization.

_______ 3. Perception of a figure, including a line, is influenced by the context in which that line appears.

_______ 4. Perceptual constancy reveals that we are always able to see things "as they are" because of past perceptions.

Now turn to Answer frame 1^9 on page 62 to check your responses.

FRAME 2^9

Monocular cues. When we know that two objects are of equal size and yet the retinal distances they project onto the eye are different, we judge that one is more distant than the other. This cue is called *linear perspective* and can be illustrated by the experience of looking along railroad tracks. Although the tracks are equidistant, they seem, in the distance, to come together. This gives us a cue to distance. Generally, objects we see clearly are closer than those that are far away. *Aerial perspective* is the name for this cue. When one object partially obstructs our view of another one, this cue of *interposition* indicates that the obstructing object is nearer than the obstructed object. The texture of surfaces is a cue to distance, there being a *gradient of texture,* such that the nearer an object is the more clearly we perceive the texture. The lighting pattern on objects, the *shading* or shadows, gives us a cue to distance. The difference between the lightness of a roof and the shadow on the side of the building away from the sun is an example. *Motion parallax* is a cue which arises when we move our head or when we move as in a car or train. Near objects seem to move quickly in the direction opposite to our motion; far objects move much more slowly and may move in the opposite direction. Another possible cue is *accommodation* of the lens which, as we said in the last chapter, changes shape as we look at objects ranging in distance from us of up to 20 feet.

Binocular cues. The eyes, of course, are separated from one another so that when they view an object they receive slightly different images of it. This effect, called *retinal disparity,* produces the depth effect, as is readily exemplified in the stereoscope, in which the eyes are stimulated by slightly different pictures of the same scene or object. The eyes, for objects within the range of 70 feet, also *converge* as the object approaches nearer. Kinesthetic impulses arising from the action of the muscles in turning the eyes toward one another may give cues that suggest the third dimension.

Disparate stimulation also is the basis for the perception of the locations of stationary sounds in space. A sound to the left of us stimulates the left ear slightly sooner and with somewhat greater intensity than it does the right ear. It stimulates the left ear, also, at a slightly different part of its cycle, its phase, than it does the right ear. However, a sound directly in front of us cannot be readily distinguished from one behind or above us, because the intensity, time of arrival, and phase parameters do not differ for the two ears.

Movement in space is tracked by following movements of the eyes, but there is an important kind of movement, called *apparent movement,* in which there is actually no actual movement in the real world. Imagine two vertical bars of light near to each other in a dark room. Each light can be turned on or off independently of the other one. If the lights are turned on simultaneously or almost so two lights will be seen, and if there is a long delay, a second, for example, between their onsets, they will be seen as two lights turned on successively. However, if the time interval between their onsets is just right, the perception is one of motion, called the *phi phenomenon.* Apparent movement, of course, is funda-

Answer frame 1^9

1. True. In perceptual integration, it is often the case that direct relations of experience to sensory events are lost and even that perception sometimes seems to belie the events which go on in the receptors.
2. True. The *proximity* principle says that if there are a number of figures, we group those together that are nearest to one another or similar to one another. The principle of *good continuation* says that we see curves and straight lines as continuing in their respective patterns. Other principles include that of the *good figure, common fate,* and *closure.*
3. True. An illustration of the influence of organization (context) on perception is provided by geometric illusions such as the Müller-Lyer illusion in which two equal lines are made to look unequal.
4. False. We do not always see things "as they are" but as they were. For example, a plate may seem round even though it is seen from an angle and is surely noncircular.

If you missed any of the above, you should restudy Frame 1^9 before turning to Frame 2^9 on page 61.

Frame 2^9 continued

mental to our perception of movement in still pictures presented in succession, as they are in moving pictures. It is sometimes referred to as stroboscopic movement.

We also perceive movement in a stationary object when its framework moves, as when the moon, seen through rapidly moving clouds, seems to race across the sky. There is also *autokinetic* movement, in which a stationary point of light, in an otherwise dark room, seems to move when someone fixates it.

The perception of real motion is complex, because the perception differs with the speed of the moving object under well-controlled conditions. Included are perceptions that the object is moving backward, that there is more than one object, and that we see a "blur" (at high velocities). A kind of constancy of speed is seen when two objects at different distances move at the same rate. Their retinal patterns must be different, but their speeds are seen as the same.

IS PERCEPTION LEARNED OR INNATE?

A question of long interest is whether we learn to perceive or whether perception is innate. Several lines of inquiry have sought to study this issue. One series of reports describes how people see when, after being blind from birth, their sight is restored. These people were aware, at once, of the figure-ground distinction, but they were handicapped in ability to discriminate simple figures, to recognize them after having seen them earlier, or in learning names for them. The figure-ground distinction is found in very young infants, who fixate their gaze on a pattern placed against a background. The infant young of several species, including the human, seem to perceive depth very early. This is shown in an apparatus called the visual cliff, in which the impression of depth is conveyed, even though a heavy glass platform extends over the "deep" part. Infants avoid this part of the apparatus, even though they may feel the glass with their hands and thus "know" there is a supporting surface over the "deep" side. On the other hand, deprivation of sensory experience seems to affect the perceptual development of some animals. While rats perceive depth after rearing in the dark, cats seem to require experience, perhaps including the opportunity to move about the environment, to do so. Chimpanzees seem to require patterned visual stimulation in order to develop normal perception, and tactile experience seems to be necessary for these animals to locate stimulation accurately on the skin.

Another approach has been to have human volunteers wear glasses which distort the field of vision, including reversing right and left and up and down. Eventually people adapt themselves to these glasses and function well, only to have to readapt themselves when the spectacles are removed. An important question here is whether the perception, as well as the movements the subjects make, adapts itself to the distortion. There is reason to doubt that it does, although this point is not entirely certain.

From all of these approaches, it seems to be clear that *some of perception is innate but that experience is required for much of it.* There is, of course, no question that our names for objects and much of the significance of perceptions and many of the uses to which we put them are learned. We should mention, however, that the role of innate factors has recently been supported by experimental results showing that in the cat's eye, anyway, there are cortical cells which respond differentially to lines when they are tilted in various degrees from the vertical. It may be that a number of features that enter into perception do so because of the presence of *innate detectors* in the visual system.

Finally, we must mention that *attention is selective;* we attend to only part of the sensory input and relegate much of the rest of it to the margin of awareness. We focus our attention on parts of stimulation that are large and intense, that move, and that are repeated. Change, or contrast with what has been going on, is attention getting. Furthermore, our interests and motives lead us to attend to some things and ignore others, as can be seen in the different perceptions of a geologist and a birdwatcher during an excursion into field or forest. Furthermore, our perceptions are influenced by our expectations of what we will experience. Expecting the arrival of a guest, we may "hear" the car in the driveway, when it is only the passing of another car on the street.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. When we know that two objects are of equal size and yet the retinal distances they project on the eye are different, we judge that one is more distant than the other.

______ 2. Our perception is such that we are able to distinguish moving objects from stationary objects.

______ 3. Some of perception is innate, but experience is required for much of it.

______ 4. Attention is selective: we attend to only part of the sensory input and relegate much of the rest of it to the margin of awareness.

Now turn to Answer frame 2^9 on page 64 to check your answers.

Answer frame 2^9

1. True. This cue is called linear perspective.
2. False. We sometimes perceive movement in a stationary object when its framework moves (e.g., the moon seen through moving clouds). There is also *autokinetic* movement, in which a stationary point of light in a dark room seems to move when someone fixates it.
3. True. Tests have been made on blind people who have had their sight restored, young infants, animals, and subjects who are fitted with distorted glasses. These tests reveal that infants seem to perceive things like depth very early but many other perceptions are learned.
4. True. We focus our attention on parts of stimulation that are large and intense, that move, and that are repeated. Change or contrast with what is going on is also attention-getting. Furthermore, our interests and motives lead us to attend to some things and ignore others.

If you missed any of the above, you should review Frame 2^9 before beginning Chapter 10 below.

chapter 10

MOTIVATION

FRAME 1^{10}

Our actions often involve choice and are frequently persistent. We seek to achieve goals, and we may do so vigorously or lackadaisically. Motivation is the term which designates these phenomena. It is usually said that motivation involves three problems: the *direction of behavior,* i.e., the reasons we make choices or work for one goal rather than another; the *persistence* of our goal-related activity; and the *degree of vigor* or *arousal* that characterizes our efforts toward a goal. Psychology was not always concerned with these problems, and one finds little or no mention of them in the writings of Wundt or Titchener. However, in the 20th century, with the advent of psychoanalysis and functionalist, including the later behavioristic, psychology, motivation has assumed a major role in discussions of the origins of conduct.

Motivation entered psychology in the form of *instinct* and in the form of *unconscious sources* of conduct. Animals perform a number of activities, such as mating, care of the young, nest building, and migrations which do not seem (in many cases) to be learned and which are essential to the survival of the species or of the individual. Instincts were introduced to explain such activities. Freud found that his neurotic patients were usually unaware of the motives underlying their symptoms and difficulties, and he spoke of unconscious motivation to account for them.

The instinct concept was much abused in its use, and it was replaced by the concept of *drive,* a term which is neutral with respect to many of the excessive claims of instinct theorists. However, the concept of unlearned behavior patterns has continued, especially in the writings of the ethologists. The notion of unconscious motivation is accepted, although many of Freud's ideas have been modified in recent years.

Drive designates an internal state whose presence *energizes* (or invigorates) behavior and gives it its *direction, persistence,* and *goals.* In recent years the notion of *incentives,* or goals, has received more prominence than in the past, as it has become clear that external objects (food, water, a mate, and the like) are very important to the occurrence of motivated behavior. The trend in motivational theory has been to emphasize incentives, while at the same time detailed accounts of the neurochemical bases of such drives as hunger, thirst, and sex have developed. Motivation has been divided into physiological and psychological categories, a distinction we shall follow here. The word *motive* is often used in respect to psychological motivational states, *drive* for the physiological states. Incentive applies to both.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. Motivation refers only to the degree of vigor or arousal that characterizes our efforts toward a goal.

_______ 2. Psychologists have generally accepted the concept of instinct and other forms of unconscious sources of conduct.

_______ 3. Drive designates an internal state that energizes behavior and gives it direction, persistence, and goals.

_______ 4. The word *motive* is often used in respect to *psychological* motivational states, drive for *physiological* states, and incentives apply to both.

Now turn to Answer frame 1^{10} on page 66 to check your responses.

FRAME 2^{10}

PHYSIOLOGICAL ASPECT OF MOTIVATION

Motivation was seen, at an early stage, as *homeostatic* in nature. This implied a balance in bodily processes and that regulatory mechanisms would come into operation when the balance was upset. Food deprivation, for example, would result in a disturbance of the sources of the body's energies, and the resulting hunger would result in food-seeking and eating, which restore the deficits and therefore the balance. This view led initially to theories of motivation which postulated *local sources of stimulation:* stomach contractions for hunger, a dry mouth and throat for thirst, and discomfort in the genital organs for sex. Local stimulation, however, is not sufficient to explain these drives, as food-seeking and eating, drinking, and sexual behavior continue when the appropriate organs have been anesthetized or altered. Interest then turned to *chemical* and *neural* factors.

In hunger, it is now known that regions of the *hypothalamus* control eating and the cessation of eating. The *lateral region* of this structure controls eating, as its destruction produces aphagia (absence of eating). The *ventral-medial nucleus* seems to provide a "stop-rule" for eating, as its destruction leads to overeating, at least when palatable food is readily available. The cells in these structures of the hypothalamus seem to be sensitive to concentrations of substances in the blood, although the specific means by which they are stimulated are not at present completely understood. There is a *drinking center* in the hypothalamus, as well, and it responds to variations in the amount of water in the cells of

Answer frame 1^{10}

1. False. Motivation is concerned with *three* problems: the *direction* of behavior; the *persistence* of our goal-related activity, and the *degree of vigor* that characterizes our efforts.
2. False. The instinct concept has been replaced by the concept of *drive*, a term which is more neutral with respect to many of the claims of instinct theorists. The notion of unconscious motivation is accepted, although many of Freud's ideas have been modified.
3. True. In recent years the notion of incentives or goals has received more prominence than in the past, as it has become clear that external objects (food, water, and so on) are very important to the occurrence of motivated behavior.
4. True. Motivation has been divided into physiological and psychological categories and the trend in motivation theory has been to emphasize incentives.

If you missed any of the above, you should restudy Frame 1^{10} before turning to Frame 2^{10} on page 65.

Frame 2^{10} continued

the body (degree of hydration), although there are apparently other factors that can control thirst such as total volume of bodily fluids. *Sex* is mediated by two factors: a state of *hormonal readiness* and the presence of *external stimuli arising from a mate* (in the human, symbolic stimuli can play this function). The hormones are *androgen* (e.g., testosterone) in the male, and *estrogen* in the female. A number of neural structures are involved in sexual behavior, including the hypothalamus. Hormonal control of sexual behavior is not as important in the human, as it is in lower animals; in lower species the female is often responsive seasonally or episodically as in the "heat" period of the estrous cycle.

Biological drives are initiated by *deprivation*, and their influence on behavior is seen in rate of consumption of food or water, performance of learned acts, overcoming of obstructions, and choices. In all of these measures, however, there is a combination of the deprivation state and the presence of an incentive. One measure of drive, general activity, has often been thought not to involve incentives, but it now seems to be clear that earlier demonstrations of the relation of activity to drive were confounded by the anticipation that incentives would appear. In addition, activity is influenced by learning so that it does not seem to be a satisfactory measure of "pure drive."

That deprivation or drives automatically impel animals to be active, as one form of the homeostatic model asserts, seems no longer to be a tenable proposition. There are many other reasons for doubting the adequacy of a simple homeostatic model, especially one that posits drive or stimulation reduction as essential. Thus, we now know that animals can be reinforced by *increases in stimulation*, as by lights or sounds or the opportunity to look through a window in a cage with otherwise opaque walls. Monkeys will *manipulate* and become expert at disassembling puzzles, even when they are not motivated by drives such as hunger or thirst and even though there is no reward for doing so. Even young animals and human infants evince *curiosity*, as manifested in their visual exploration of relatively complex rather than simple stimulus patterns. Adult human subjects tend to find conditions of *sensory deprivation* intolerable (though there are wide individual differences), suggesting a *need for stimulation*. There is evidence for a *need for contact* in infant monkeys, which prefer an artificial "mother" covered with terry cloth, even though they nurse from a bottle attached to a wire mother. Animals and men seem to need to be active, even though their basic biological needs are met. There are *reward systems* in the brain which, when stimulated electrically, are reinforcing and seem to give rise to pleasure.

External stimuli, then, seem to have an important role in motivation. In one kind of case they work in conjunction with an internal bodily state, set up by deprivation or by a hormonal condition. Thus food interacts with deprivation of food to produce eating and related behaviors. A mate and young interact with hormonal readiness to produce sexual and maternal behavior, respectively. In other cases, external stimuli, as in curiosity, manipulation, and exploration, seem to meet a need for variety in stimulation. This is seen even in the case of *specific hungers,* in which animals will consume large quantities of specific substances of which they have been deprived, like salt or proteins. In this instance, the old diet (salt-free or protein deficient) seems to become aversive, and any novel diet seems to be preferred to the old one. In addition, there are tastes, such as a sweet (to the human) taste which seem to be inherently attractive to some animals, so that they will work to obtain them even though they are not hungry.

External stimuli are incentives, and current theory suggests that they operate through a mechanism called *arousal.* This mechanism has also been advanced in the case of emotions, and in the next chapter we will examine arousal theory; its role in motivation should be apparent from this examination.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_____ 1. Motivation may be explained through the concept of homeostasis, which postulates local sources of stimulation: stomach contraction for hunger, a dry mouth for thirst, and so forth.

_____ 2. The controls for hunger and thirst have been found somewhere in the brain.

_____ 3. Deprivation or drives are sufficient to automatically impel animals to be active, as one form of the homeostatic model asserts.

_____ 4. External stimuli seem to have an important role in motivation.

Now turn to Answer frame 2^{10} on page 68 to check your answers.

FRAME 3^{10}

PSYCHOLOGICAL ASPECTS OF MOTIVATION

It is difficult to believe that all of our behavior is the result of physiological drives in interaction with incentives, and theories of motivation have looked to other kinds of motives to supplement the physiological ones. Three major views have been taken. One is to propose *acquired drives,* learned on the model of fear. A second is to postulate *fear or anxiety* as underlying other apparent motives. The third is to propose *various motives,* without, in some instances, being very specific as to their acquisition. We deal with each in turn.

1. We discussed avoidance learning in Chapter 5, and this paradigm has been used to demonstrate that *fear* can be a learned motive. The experiments have used a box, divided into two compartments, one painted white, one black. The animal can be shocked in one compartment but can avoid the shock by jumping a hurdle into the other compartment in advance of the onset of the shock. That the animal is fearful is demonstrated by the fact that he will learn responses (without further shock), such as pressing a lever or rotating a little wheel, to open a door between the compartment in which he has received shock and the one which has been shock free. The strength of this fear drive is related to the intensity of the original shocks and is resistant to extinction.

Pain presumably sets up a basic drive, and the fear is learned as an anticipation to the pain. Attempts to set up learned drives on the basis of hunger, however, have not been successful in this situation. These failures, of course, give no support to the idea that learned drives other than fear can be developed in the same way as fear can be learned.

2. Several writers have suggested that underlying such motives as those for approval, success, and

Answer frame 2^{10}

1. False. Local stimulation is not sufficient to explain the drives for food and drink, and so on, because these drives continue even after the appropriate organs have been anesthetized. Interest has thus centered on chemical and neural factors.
2. True. The lateral region of the hypothalamus controls eating, as its destruction produces aphagia (absence of eating). The ventral-medial nucleus seems to provide a "stop-rule" for eating. There is a drinking center in the hypothalamus as well.
3. False. Animals and men seem to need to be active even though their basic biological needs are met. The homeostatic model just does not seem adequate to explain behavior other than that reinforced by stimulation reduction.
4. True. In one case external stimuli work in conjunction with an internal bodily state (food interacting with deprivation of food). In other cases, external stimuli, as in curiosity, manipulation, and exploration, seem to meet a need for variety in stimulation.

If you missed any of the above, you should reread Frame 2^{10} before turning to Frame 3^{10} on page 67.

Frame 3^{10} continued

money is anxiety or fear and that the *apparent motives really represent fear.* The arguments for this position, while often plausible, have seldom been tested. However, some findings with the affiliation motive indicate that fear can underlie other apparent motives.

Affiliation means to want to join with someone else. In the studies mentioned, fear has been aroused in human subjects by indicating that they are to be subjected to intense electrical shock, which, however, will do no permanent damage. The subject is asked to wait, after this introduction, for the experiment to begin and is given a choice between waiting alone or with others. Firstborn children choose to wait with others, whereas later born children choose to wait alone as often as to wait with others. This suggests that among firstborn children the fear produces affiliative behavior. One would hesitate to say, however, that later born children show no affiliative behavior, and some mechanism other than fear must be involved in their cases.

3. Various *other motives* have been suggested and, while they are learned, it is not proposed that they are learned on the model of fear. Most of them are measured by means of a *projective test,* called the Thematic Apperception Test (TAT). Experiments have been done to validate ways of scoring this test, differences in other behaviors between those who score high and those who score low have been observed, and some effort has been made to uncover the factors in early life that are associated with high and low scores. We discuss here the motive or *need for achievement* which has received the greatest attention, although power, affiliation, and other motives have been studied in this way.

The need for achievement has been defined as involving competition with a standard and to test for it subjects are asked to write stories in response to questions about a series of pictures chosen to get at achievement. A scoring system was developed for the stories, the system being based on differences in the stories written by subjects in whom the achievement need had been aroused experimentally and by subjects in whom the need was not aroused. It is possible, then, to score stories not written under arousal conditions for achievement motivation.

People who score well for achievement on the TAT do better on a number of tasks than those who score low, for example, on a scrambled words test. They also behave differently in risk-taking situations. In a complex task or gambling situation for instance, high-need achievers set their goals in the middle range of success, not either extremely high or extremely low. Thus, they see no point to aspiring to a level of performance they probably cannot reach but also wish success to mean something so that their aspirations are not low. Other persons, however, in whom *fear of failure* rather than *hope of success* dominates, are likely to set their goals very high, at a level at which they can hardly be blamed for failure, or very low, where success is almost assured.

High-need achievement seems to be associated with an early age at which the child was allowed to do things independently, that is, on his own.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. It has been found that acquired drives can be developed in the same way that fear can be learned.

______ 2. Underlying such motives as those for approval, success, and money is anxiety or fear and it is clear that the apparent motives really represent fear.

______ 3. People who score well for achievement on the Thematic Apperception Test do better on a number of tasks than those who score low.

______ 4. High-need achievers set their goals extremely high in a complex task or gambling situation.

Now turn to Answer frame 3^{10} on page 70 to check your answers.

FRAME 4^{10}

PSYCHOLOGICAL ASPECTS OF MOTIVATION *(continued)*

Inventories have been used to measure motives like anxiety and desire for social acceptance or approval. A number of statements are drawn up in these cases, because they are thought or judged to be related to the motive in question. The *Manifest Anxiety Questionnaire* has been used to select subjects who differ in anxiety. While the highly anxious subjects form simple conditioned responses more quickly than do the subjects with little anxiety, other situations in which the two groups should have differed (in either direction) have produced inconsistent results. Subjects whose scores vary from high to low on the *approval need* differ in other tasks, such as ease of verbal conditioning.

No complete list of human motives has been drawn up and accepted, but anxiety, approval and achievement show up on most such lists. Another motive that appears is *aggression.* Some writers, Freud, for example, argued that aggression is instinctive. Others have argued either that it is instinctive or that it is inevitable, arising from tendencies to defend one's territory, or to compete for food or for mates. Present opinion among psychologists, however, denies instinctive status to aggression and attributes it to other factors. Among these are the habit of being aggressive, which is often rewarded by the attainment of desired outcomes, frustration, one of whose consequences is aggression, injury, insults, and threats, which elicit actions in kind, and deprivation, in which case a deficit (of food, for example) may be severe enough to lead to aggressive acts in order to obtain what is required to meet the deficit. All of these factors suggest that aggression is not due to an instinct or a drive with a special energy of its own, but they do not, of course, deny that aggression occurs. In many species, aggressive behavior does have a relatively fixed form, and stimulation of parts of the brain can evoke parts, at least, of aggressive behavior patterns. But aggression is usually elicited by someone or something in the presence of anger, frustration, or deprivation. Some people, of course, are habitually aggressive.

Some writers have proposed a *hierarchy of motives,* despite the lack of agreement on a list or classification of human motives. Physiological states, are at the bottom of the hierarchy, with anxiety and certain other needs a little higher. At the top are highly individual needs, including the need for *self-actualization.* It is postulated that the higher needs cannot be dominant in the expression of behavior until the lower needs are satisfied or partially so. There is evidence that some needs, like hunger, are capable at times of dominating our thoughts and actions, but there is little or no firm evidence to

Answer frame 3^{10}

1. False. Attempts to set up learned drives on the basis of hunger have not been successful and give no support to the idea that learned drives other than fear can be developed in the same way that fear can be learned.
2. False. The arguments for this position, while often plausible, have seldom been tested. Tests on affiliation behavior which found that later born children show no affiliative behavior in fear situations indicate that some mechanism other than fear must be involved. The answer to this question, therefore, is more accurately described as "uncertain."
3. True. Those who score high, for example, do better on a scrambled words test. They also behave differently in risk-taking situations.
4. False. High-need achievers set their goals in the middle range of success. Thus, they see no point in aspiring to a level they cannot reach.

If you missed any of the above, you should review Frame 3^{10} before turning to Frame 4^{10} on page 69.

Frame 4^{10} continued

support the idea that self-actualization would emerge strongly if other needs were satisfied.

Before closing, we should mention that conflicts or inconsistencies among our ideas or our information can give rise to a motivational state called *cognitive dissonance.* The manner in which this motivation works can be illustrated by an experimental example. Female subjects were solicited to participate in a discussion of sex. They were told that a screening was necessary before they could be admitted to the discussion group. Half the subjects were given a mild screening, consisting of innocuous questions, but the other half were given an embarrassing kind of interview. In it they had to say things in the presence of a male experimenter that were very obscene. All of the subjects then listened to the group discussion (actually, a tape) as a prelude to their actual introduction to the group and were asked to rate the interestingness of the discussion. (The discussion was concerned with sexual behavior in animals and was designed to be dull.) The severely screened subjects rated the discussion as more interesting than the ones given the mild screening. In cognitive dissonance terms, the subjects had two dissonant pieces of information: the knowledge of the severe screening and that of the dull discussion. To resolve this dissonance, they rated the discussion as interesting, thus making the evaluation of the discussion consonant with the embarrassment they had experienced during the severe screening.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. Inventories (tests) have been used to measure motives like anxiety and desire for social approval with consistent results.

_______ 2. Freud and others have prepared rather complete widely accepted lists of human motives.

_______ 3 There is strong evidence to support the idea that self-actualization would emerge strongly if other needs were satisfied.

_______ 4. Conflicts or inconsistencies among our ideas or our information can give rise to an emotional state called cognitive dissonance.

Now turn to Answer frame 4^{10} on page 72 to check your answers.

chapter 11

AFFECT, EMOTION, AND AROUSAL

FRAME 1^{11}

Everyone knows about emotions such as fear, rage, joy, elation, and love, but there are other *states of feelings* besides these and other major emotions. These states of feeling are less intense than emotions and represent, in pleasantness or unpleasantness, for example, the *affective tone* of experiences. There is reason to think that the mild effects differ from the strong emotions chiefly in their intensity; one can have an enduring state of affect, which we may call a *mood*, and there are, of course, such enduring emotional states as *chronic rage* or *chronic anxiety*.

There is a close relation between emotion and motivation. Indeed, as we saw in the last chapter, some motives have names which are also used to label emotions—fear and anxiety are good examples. The *arousal theory* of emotions, which we will discuss below, is often applied also to motives. But emotions can be separated from motives for separate study. In this chapter the topics concern the physiological basis of emotion, theories of emotion, emotion and performance, emotional expression, and some effects of emotion.

PHYSIOLOGY OF EMOTION

In emotional states, we are often aware of *bodily reactions;* a pounding heart, tense·muscles, sweaty palms, trembling, for example. Such experiences, as well as theories of emotion, have led to extensive study of bodily changes in emotion and to attempts to discern whether distinct patterns of bodily changes characterize emotions and differentiate them from one another.

Important in emotion are the secretions of the medulla of the adrenal glands, *epinephrine* (adrenalin) and *norepinephrine* (noradrenalin). The effects of the former are to raise the blood pressure and pulse rate, to release sugar into the blood from the store in the liver, to augment clotting of the blood, enhance breathing, enlarge the pupils of the eye, and other, similar changes. Norepinephrine constricts the blood vessels in the body surfaces, thus making it available elsewhere. These actions parallel those of the *sympathetic branch* of the *autonomic nervous system,* also involved in emotion. Actually, the discharge of epinephrine and norepinephrine by the adrenal is in response to the sympathetic nervous system activity. There are, of course, central nervous system actions as well, resulting in stimulation of movements of the skeletal muscles of the face and other parts of the body. There is an area in the hypothalamus which when stimulated elicits a "rage" pattern in cats, and the reticular system, according to some views, has a major role in emotion.

The result of these neural and endocrine activities is to produce bodily changes, and these changes, while complicated, can be and have been measured in the study of emotion. Among these changes are variations in the electrical conductivity of the skin (*Galvanic Skin Response,* or GSR), in *blood pressure* (measured by means of a sphygmomanometer), in the *breathing pattern* (measured by means of a pneumograph), in *heart activity,* and in *degree of dilation of the pupil* of the eye. Some of these reactions, recorded on a polygraph, are used in *lie detection.* The principle of the "lie detector" is that people will respond emotionally when they tell falsehoods, and GSR, heart action, and breathing are often recorded in response to questions to which the person being tested gives answers. While not infallible, the use of the lie detector can be success-

Answer frame 4^{10}

1. False. The Manifest Anxiety Questionnaire results show that while highly anxious subjects form simple conditioned responses more quickly than subjects with little anxiety, other situations in which the two groups should have differed have produced inconsistent results.
2. False. No complete widely accepted list of human motives has been drawn up, but anxiety, approval, and achievement show up on most lists that have been attempted.
3. False. There is evidence that some needs, such as hunger, are capable at times of dominating our thoughts and actions, but there is little or no firm evidence to support the idea that self-actualization would dominate if other needs were satisfied.
4. True. To resolve the dissonance caused by inconsistent information, people will attempt to make the two pieces of information consonant through selective perception or some other dissonance-reducing technique.

If you missed any of the above, you should restudy Frame 4^{10} before beginning Chapter 11 on page 71.

Frame 1^{11} continued

ful; however, its evidence may not always be introduced into court, and there are some interesting implications in its use with respect to whether it makes a person testify against himself.

The bodily changes occur in many, if not all, emotions, so that the fact of their occurrence tells us only that the person is probably having an emotion. They do not tell us what emotion is going on. A great deal of effort has been devoted to the attempt to find patterns of bodily change distinctive of the several emotions. One study did succeed in differentiating between fear and anger, those changes associated with fear resembling those induced by epinephrine and those associated with anger resembling those produced by both epinephrine and norepinephrine. In general, the results so far have not differentiated emotions from one another very successfully in terms of bodily reactions. One reason is that the pattern of bodily reaction in one person differs from that shown by another.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. States of feeling which are less intense than emotions and represent, for example, pleasantness or unpleasantness are known as the *affective* tones of experience.

______ 2. Important in emotion are the secretions of the medulla of the adrenal gland, epinephrine (adrenalin) and norepinephrine (noradrenalin).

______ 3. Neural and endocrine activities produce bodily changes which, while complicated, can be and have been measured in the study of emotion.

______ 4. Emotions may be differentiated from one another very successfully in terms of bodily reactions.

Now turn to Answer frame 1^{11} on page 74 to check your responses.

FRAME 2^{11}

THEORIES OF EMOTION

One reason for interest in the bodily changes which accompany emotion and in their differentiation comes from the *James-Lange theory of emotion,* espoused independently in the 19th century by William James and Carl Lange. The basic thesis of this view is that the bodily changes precede and "cause" the emotional experience. James put it this way: We are afraid because we run; and are sad because we cry. Another theory, the emergency theory, pointed to the physiological changes as preparatory for action, whatever the action was to be; "flight" or "fight," for example. Neither theory has been disproved, though the failure to find bodily patterns distinctive for each emotion is troublesome for the James-Lange theory.

Since 1962, a *cognitive theory* proposed by Stanley Schachter and Jerome E. Singer has received favorable attention. Earlier work had shown that injections of adrenalin produce "as if" emotions, not the emotion itself. Thus a person would say, "I feel as if I am afraid" after the injection rather than that he is afraid. Schachter and Singer combined injections of adrenalin (or a placebo in control cases) with two other manipulations. One was to inform or misinform the subjects as to the effects of the injection they were to receive or to tell them nothing. The drug was called Suproxin, alleged to be a vitamin supplement. The other was to have the subject wait with another person, a stooge of the experimenter's while the drug took effect. The behavior of the stooge was either angry or euphoric. The subjects were observed and also rated their moods. The misinformed and uninformed subjects behaved like the stooge and rated their feelings as elated or as angry, in parallel to his behavior. The informed subjects did not, presumably because they had been given accurate information as to the drug effects. The misinformed and uninformed subjects were aware of bodily reactions and interpreted them as being the emotion (elation or anger) which the situation (the behavior of the stooge) suggested. This theory is not troubled by the commonality in patterns of bodily reactions to different emotional situations; the common reactions will be interpreted as one emotion or the other as the perceived situation indicates.

Another theory is the *arousal or activation theory of emotion.* Some of its advocates refer to situational factors as determining what emotion one will say he is having, but the main point of the theory is to suggest that there is a continuum of arousal and that the emotions lie on this continuum. The continuum ranges from sleep at one end to excitement at the other, and it receives some support from patterns of electrical activity in the cortex of the brain as seen in the *electroencephalogram (EEG).* In a normal, awake resting state, the electrical activity of the brain shows rhythmic waves at a frequency of 10 to 14 per second. When problems are given to be solved, when stimuli are presented, or in emotional states this pattern changes so that the waves increase in frequency and decrease in size or amplitude. In sleep, there are several patterns, but the waves tend to be slower and to have greater amplitude than they do in the relaxed, resting state. The pattern of electrical activity seems to be dependent on impulses coming from the reticular formation, which, in turn, receives impulses from sensory tracts and other sources. Hence, under stimulation the reticular system will be activated and will send impulses to the cortex activating or energizing it. The theory further holds that behavioral performance is at its peak efficiency at moderate levels of arousal, with either low or high levels (as in sleep or excitement) being associated with behavior that is not very effective. A good deal of evidence supports this relation between arousal and performance; with efficiency at a peak for moderate levels of arousal, a plot of the relationship resembles *an inverted U.* As stated in the last chapter, low degrees of stimulation are undesirable and novelty and complexity of stimulation are motivating. These findings are consistent with the arousal theory.

There are several problems, however, with the concept of arousal. One is that the indices of arousal (GSR, heart rate, and so on) do not correlate well with one another. A second problem is that, under experimental conditions, it is possible to disassociate arousal and performance. Another difficulty is that sleep is not a homogeneous state. For example, there is a kind of sleep, called *rapid eye movement sleep* or REM sleep, which occurs part of the time when we are asleep. Eye movements, measured by recording of the electrical activity they generate, and other indices indicating arousal occur at times

Answer frame 1^{11}

1. True. There is reason to believe that the mild *affects* differ from the strong emotions chiefly in their intensity.
2. True. The effects of adrenalin are to raise blood pressure and heart rate, to release sugar into the blood from the liver, to augment clotting of the blood, enhance breathing, enlarge the pupils of the eye, and other such changes. Norepinephrine constricts the blood vessels in the body surfaces, thus making it available elsewhere.
3. True. Among these changes are variations in the electrical conductivity of the skin (Galvanic Skin Response or GSR), in blood pressure (measured by a sphygmomanometer), in breathing (measured by a pneumograph), in heart activity, and in degree of dilation of the pupil of the eye.
4. False. Bodily changes occur in many, if not all, emotions, so that the fact of their occurrence tells us only that the person is having an emotion, but they do not tell us what emotion is going on.

If you missed any of the above, you should restudy Frame 1^{11} before turning to Frame 2^{11} on page 73.

Frame 2^{11} continued

during the night; we are asleep, however, when they occur. REM sleep seems necessary to us, as its prevention causes irritability and inefficiency. REM sleep occurs in conjunction with dreaming, but it is not clear whether REM depends on dreams or conversely. Lower animals and very young infants show REM sleep, and this may mean that REM sleep is not necessarily an accompaniment of dreams. In any case, sleep is not a homogeneous condition.

EXPRESSION OF EMOTION

We express emotion in our faces, our speech, gestures, gait, posture, and in the words we use. Some expressions are rather typical, others show cultural variations. The *Startle Reaction*, for example, which occurs to a sudden, loud stimulus, occurs quickly and involves closing the eyes, widening of the mouth, and a thrusting forward of the neck and head. Its commonality suggests that it may be innate. On the other hand, native Chinese express surprise by sticking out their tongues, an act which, in the United States, has a different meaning.

There are many emotional names, and one investigator asked an actor to pose for pictures as he expressed 72 different emotions. Judges then sorted the pictures into six categories. Tabulations of the judgments arranged the pictures in an order best represented by a circle, indicating that the emotions shade into one another. One dimension underlying this arrangement is *pleasantness-unpleasantness* and another *rejection-acceptance. Arousal level* is a third dimension of emotion, and it may be that emotional expressions can be fitted into a three-dimensional space, in the shape of a cone. The third dimension of this space is given by the arousal continuum. A similar but not entirely identical arrangement emerges when people's judgments of emotional words are analyzed.

We are all aware of shades of emotions arising from variations in the voice, and, of course, intense emotions may be accompanied by shrieks or screams. The main investigations of emotion as expressed in the voice have concerned anxiety, and they have shown that anxiety can be detected through features of the voice.

Judgments of what emotions are being expressed are often surprisingly poor, unless the judge knows what situation accompanies the expression. Then the judgments are accurate. Perhaps one must interpret expressions, as he interprets bodily changes, in terms of the situation in order to "know" what emotion is going on.

SOME EFFECTS OF EMOTION

It is generally believed that the expression rather than the suppression of emotion is desirable from the health standpoint. It is known that chronic, often suppressed, emotions may play a role in some illnesses, such as headaches, low back pain, chronic fatigue, all of which seem to result, in some cases, anyway, from prolonged emotional tension. Tissue damage, in other cases, as in peptic ulcer, can result from the frequent occurrence of the bodily reactions of emotional tension. Such disorders are referred to as *psychosomatic disturbances,* indicating the important role that emotions may have in bodily complaints and illnesses.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. The James-Lange theory of emotion has as its basic thesis that bodily changes precede and "cause" emotional experiences.

_______ 2. Schachter and Singer developed a cognitive theory which has shown that an injection of adrenalin produces anger.

_______ 3. The activation or arousal theory of emotion holds that behavioral performance is at its peak efficiency at moderate levels of arousal, with either low or high levels being associated with behavior that is not very effective.

_______ 4. Eye movements and other indices indicating arousal show that we are aroused at certain times of the night even when we are asleep.

_______ 5. It is generally believed that it is healthier to suppress one's emotions rather than express them openly.

Now turn to Answer frame 2^{11} on page 76 to check your answers.

Answer frame 2^{11}

1. True. Another theory, the emergency theory, states that physiological changes are preparatory for action. Neither the James-Lange nor the emergency theory have been disproved thus far.
2. False. Subjects in tests of various drugs showed that their reactions were due to their perception of the situation in combination with the effect of the drugs.
3. True. A good deal of evidence supports the relation between arousal and performance, with efficiency at a peak for moderate levels of arousal.
4. True. There is a kind of sleep called rapid eye movement sleep, or REM sleep, which occurs part of the time we are asleep and seems to be quite necessary since its prevention causes irritability and inefficiency. These REM periods of sleep indicate that arousal occurs even when we are sleeping.
5. False. It is known that suppressed emotions may play a role in illnesses such as headaches, back pain, and fatigue.

If you missed any of the above, you should reread Frame 2^{11} before beginning Chapter 12 below.

chapter 12

PSYCHOLOGICAL MEASUREMENT AND STATISTICS

FRAME 1^{12}

In an earlier chapter, we spoke of psychophysics, and this discipline involved measurements in the form of detection of a just noticeable sound or light, for example, or in the determination of a just noticeable difference between two pitches or two brightnesses. But measurement in psychology goes beyond psychophysics. It includes measures made in terms of physical units, such as the *time* it takes to respond to a stimulus (reaction time or latency), the *force* and the *size* of a movement, and counts of the *frequency* of reactions. But many psychological characteristics cannot be assessed in physical units or in directly countable frequencies. Examples are *traits,* such as personality and intelligence. An entire subfield of psychology has grown up around the measurement of traits, and we introduce it here, reserving to the following chapters study of particular traits. In this chapter, we shall also be concerned with statistics, because measurement involves statistical concepts, as do comparisons of experimental treatments.

An important aspect of behavior is its *variability*. People differ from one another; this is called interindividual variability or *individual differences.* The same person varies from time to time; i.e., there is intraindividual variability. If there were no variability among people or within individuals, psychology would have little or no reason for being. Measurement and statistics are designed to describe variation, and statistics has the important additional functions of summarizing data and showing their interrelations and of determining whether variation may be attributed to chance or not.

USES OF NUMBERS

Sometimes numbers are used essentially as ways of identification–a name, in other words. People have social security numbers, which serve to identify their accounts and other documents as belonging together. But such numbers do not measure anything. We should not see any point to finding the average social security number, for example. Numbers are also used to express *ordinal* relations. For example, we can *rank* five people in order of height. Suppose that one is 6 feet 6 inches, the next 5 feet 8 inches, and then the rest are 5 feet 7 inches, 5 feet 6 inches, and 5 feet 5 inches. The ordinal numbers from one to five could be applied to these people. This is an advance over numbers as names, involving the application of numbers to an arrangement of the people involved. However, in the example, the interval between rank 1 and 2 is 10 inches, whereas the other intervals are only 1 inch. Ordinal arrangement is often used in psychology, but it suffers from the difficulty that the intervals may not be equal. Measurements in which the *intervals are equal* are much more desirable. In the scale of length, we know that 1 inch equals any other inch. Developing interval scales is a problem much studied in psychological measurement. The best measure is the *ratio scale.* This scale orders things and contains equal intervals. It also has a zero, which ordinal and interval scales do not, and we can make comparisons such as that the value X on a scale is twice as great as value Y. Ratio scales, however, do not exist for psychological measurement.

TESTS

We often measure traits by tests. They provide a standard situation in which behavior of some sort can be observed. In structured tests, like an achievement test of the multiple-choice form, answers are provided and the person being tested selects one of them. Unstructured tests present a standard situation (e.g., an inkblot or a picture), but the subject is free to respond as he wishes. The latter tests are difficult to score and evaluate; the former may not provide enough alternatives for the person to show what he knows.

There are various kinds of tests. Some of them are designed to measure *aptitude.* These include *intelligence tests* and tests designed to predict whether one will profit from some kind of training, such as medical training *(medical aptitude)* or training in a foreign language. Then there are *achievement tests*, designed to measure accomplishment after (or during) training. There are also *personality tests,* those that measure various traits, and *interest tests,* and a host more. Sometimes these are called inventories or questionnaires. All of them, structured or unstructured, have properties of the kind described in general terms in the sections of this chapter which follow.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Without interindividual and intraindividual variability, there would be little need for psychological studies.

______ 2. Psychology often uses ordinal numbers where the intervals are always equal.

______ 3. The best measure is the *ratio scale* which orders things and contains equal intervals.

______ 4. Psychologists often measure traits with structured and unstructured tests.

Now turn to Answer frame 1^{12} on page 78 to check your responses.

Answer frame 1^{12}

1. True. Measurement and statistics are designed to describe these variations, and statistics has the additional functions of summarizing data and showing their interrelations and of determining whether variation may be attributed to chance.
2. False. Ordinal numbers may be used to rank items from one to five, but the intervals between each number are not always equal.
3. True. The ratio scale also has a zero, which ordinal and interval scales do not, and we can make comparisons such that one position may be said to be twice as great in value as another position on a scale. Psychologists do not use ratio scales and developing interval scales is a major problem.
4. True. In structured tests (e.g., multiple-choice achievement test), answers are provided and the subject selects one of them. Unstructured tests present a standard situation (e.g., an inkblot or picture) and the subject is free to respond as he wishes.

If you missed any of the above, you should restudy Frame 1^{12} before beginning Frame 2^{12} below.

FRAME 2^{12}

DISTRIBUTIONS

Suppose that we weigh 1,000 people, adults and children, in the order in which they enter a supermarket. We record each weight in columns on sheets of paper. What will these numbers tell us? Not much, in this form, as the numbers will be unordered with respect to weight, and there are too many of them for us to do more than pick out a few extraordinary weights, like the one, say, at 278 pounds. To comprehend the data, we must organize it and compute some summary statistics.

To form a distribution, we arrange the weights in order from lowest to highest, either individually by writing 35, 36, 37, and so on (remember there are children in our sample) or by writing intervals, e.g., 35-39, 40-44, and so on. Then we tally the number of cases in our sample for each weight or weight interval. This gives us a *frequency distribution.* Such a distribution gives us a picture (we can plot it on graph paper) of the way the weights arrange themselves through the *range* we have tallied.

Many distributions of characteristics like weight or height and for number of heads obtained per toss from 1,000 flips of 100 pennies have a shape, called the *normal* curve or the *bell-shaped curve.* Such a curve says that most of the scores will cluster around a middle value (for pennies in the example, 50) and that as we move to the extremes (zero heads or 100 heads for the pennies) there are fewer and fewer tallies. The curve is symmetrical, showing the same slope to the left of its high point (the middle value) as it does to the right. The normal curve has a number of valuable properties and many statistical procedures have been worked out for it. It is the basis for much of the measurement carried out in psychology and for many of the statistical procedures psychologists use. Not all distributions follow the normal curve: some are skewed, with a very few tallies at one end and a piling up of cases at the other end of the scale; some are bimodal, having two scores which receive many tallies, with the midscores of the distribution receiving relatively few tallies. But for our purposes here, we will not be much concerned with these variations from the normal curve.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. A frequency distribution is obtained by recording the number of cases from a sample for each classification interval.

______ 2. Many distributions of characteristics like weight or height form a normal or bell-shaped curve.

______ 3. The normal curve is the basis for much of the measurement in psychology because it has a number of valuable properties and statistical procedures have been worked out for it.

______ 4. The normal curve is symmetrical, showing the same slope to the left of its high point (the middle value) as it does to the right.

Now turn to Answer frame 2^{12} on page 80 to check your answers.

FRAME 3^{12}

SIMPLE STATISTICS

Our distribution of weights gives us more knowledge than the unordered list of weights does, but we can extract even more information from it. One thing is to find out its *central tendency;* i.e., we can determine the mean, median, or mode. The *mean* is the average score, calculated by adding up all the individual scores and dividing by the number of observations, in this case, 1,000. The *median* is the middle score. We obtain it from the ordered scores by counting from one end until we reach the score which has an equal number of cases above and below it. With 1,000 cases, this is an interpolated value between the 500th and the 501st observation; thus there are 500 cases on either side of it. The *mode* is simply the most frequent score. It is not very informative, but in a perfectly normal distribution the mean, median and mode coincide. *Skewness* leads to discrepancy among these values; in such cases, the median may be more representative of the distribution than the mean, because the latter is influenced by the magnitudes of extreme scores, whereas the median is not.

The distribution represents another fact about our measurements of weight: The measurements *vary* around the average or mean. For the whole population of the United States, weight might vary from 4 or 5 pounds for newborn infants to over 300 pounds for very fat people. Scores on intelligence and achievement tests vary, too, and we often wish to know whether an individual's score differs as much from the mean in achievement as it does in intelligence. But the scores on these two characteristics may be stated in terms of number of items correctly answered and thus are not directly comparable. Is there any way to compare scores on traits whose units of measurement differ? Is an individual's weight as deviant (if it is) as his height?

The answer to this question lies in measures of variation. The normal curve has a property which makes comparison of scores from different measures possible. This property resides in a measure of variation or of dispersion around the mean, called the *standard deviation.* A simple measure of variability is the *range,* the difference between the highest and the lowest score, but the standard deviation is much more valuable. To calculate it, in principle we first subtract each score from the mean to obtain *deviations* from the mean. This will give us both positive and negative values, but squaring the deviations, the next step, makes them all positive. The squared deviations are added together and divided by the number of cases. The square root is taken of this average, and the result is the standard deviation.

The standard deviation (σ) is stated in score units, but the normal curve has the property, the one alluded to above, that within one standard deviation a certain proportion of the cases is included. The property is as follows: Between the mean and the value for one standard deviation from the mean in either direction there will be 34 percent of the cases; there will be 68 percent of the cases between the score at 1σ above and 1σ below the mean. Between 1 and 2σ from the mean in either direction there will be 13.5 percent of the cases, or 27 percent for both. And between 2 and 3σ from the mean there will be almost 2.5 percent of the cases, 4.7 percent for the two extremes together. There will be a few cases, of course, 0.3 percent, beyond 3σ from the mean both above and below the mean.

This feature of the normal curve enables us to state the position of a score in a distribution in terms of its deviation from the mean in units of the standard deviation. Such a *standard score* is found by finding the difference between the mean and the score and dividing it by the standard deviation. Standard scores are often converted to another scale by adding a constant in order to avoid negative

Answer frame 2^{12}

1. True. A frequency distribution gives us a picture (we can plot it on graph paper) of the way the sample statistics arrange themselves.
2. True. A normal curve has most of the scores clustered around a middle value, and there are fewer and fewer scores as we move to the extremes.
3. True. Not all distributions follow the normal curve, but most statistical tests used in psychology are based on the normal curve.
4. True. When there are few cases at one end of the curve and many on the other end, the curve is said to be skewed to the direction of the larger numbers. A bimodal distribution is obtained when two scores have many tallies, with the mid-scores of the distribution receiving few tallies.

If you missed any of the above, you should reread Frame 2^{12} before turning to Frame 3^{12} on page 79.

Frame 3^{12} continued

signs and decimals. However, they are all comparable, because they reduce to an expression which expresses a score in terms of its deviation from the mean in units of the standard deviation. This procedure allows us to compare scores made on different traits or on different measures, so long as the samples of people from whom the scores were obtained are comparable.

Another common procedure for reporting scores in terms of location in a distribution is the *centile or percentile rank.* One can compare these ranks across traits or measures. A centile rank of 5 is that score below which 5 percent of the cases in the distribution fall, one of 95 is the score below which 95 percent of the cases fall. The percentile is not the proportion of items one gets correct on a test but is the proportion of people whose scores are below the value for the percentile in question. A score of 75 percent on a test might in one case be at the 40th percentile but in another be at the 95th percentile.

Distributions based on large enough samples of cases are often used as *norms.* Thus a norm for achievement in reading for children of a given grade may be expressed in percentile values or standard scores. With such scores on a variety of measures, a profile of achievement can reveal the areas of study on which a child is above, below, or at the norm.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Central tendency may only be found by determining the mean.

______ 2. Standard deviation is the difference between the highest and lowest scores.

______ 3. Sixty-eight percent of the cases will be between the score at one standard deviation above and one standard deviation below the mean.

______ 4. Percentile is the proportion of items one gets correct on a test.

Now turn to Answer frame 3^{12} on page 82 to check your answers.

FRAME 4^{12}

MEASURES OF RELATION

It is often useful to determine the relationships among measures. For example, are achievement measures and measures of intelligence related? A procedure for determining whether there is a relationship and its degree is the *correlation coefficient.* A common procedure is the product moment method which yields a correlation designated by the symbol *r.*

To compute r between reading and intelligence test scores, we multiply the deviations from the mean of the scores on both tests for each individual, add the resulting products, and divide the sum by a value obtained through multiplying three other numbers: the number of cases and the standard deviations of the two distributions. The r which results will vary between -1.00 and $+1.00$ and indicates the degree of the relationship of the scores. Values around zero mean that the two sets of scores are unrelated and that one cannot predict from scores on the intelligence test what the reading score will be. Positive rs do indicate a relationship, of the form that a high score on one test is associated with a high score on the other test. Negative rs also indicate a relationship, but of another form. In this case a high score on one test is associated with a low score on the other one.

There are other ways of computing correlations, for example by using ranks, but r is the most common procedure. We can also determine the combined predictive value of a set of tests relative to some characteristic such as reading by means of a *multiple correlation.* There are also methods for the case in which two variables are not related linearly, curvilinear correlation.

It is sometimes the case that we have a set of measures for which we have intercorrelations. A technique known as *factor analysis* may be applied to these correlations in an attempt to discover whether the intercorrelations obtained can be explained in terms of a smaller number of variables. If such a result is obtained, then we can describe the interrelationships more economically than by listing all the separate measures we have intercorrelated.

One caution must be stressed in interpreting correlations, even when their values are very high (either positive or negative). This is that correlation cannot indicate cause and effects. The correlation simply indicates that measures are related to some degree. It does not indicate why they are related or that one variable causes the other.

RELIABILITY AND VALIDITY

Tests must be reliable to be of value. This means that if we give the same test more than once to the same people the scores ought to be the same or nearly so, unless there is some reason for them to have changed. Correlations of the scores obtained in this way are called *reliability coefficients,* and we usually expect them to be at 0.80 or better before we are satisfied with the reliability of a test. *Validity coefficients* are also correlations and indicate the relationship between test scores and something we wish to predict from these scores. If we wish to predict college graduation for a group of high school seniors, we may use measures of aptitude and their rank in their high school class to do so. But it is the relation between these measures and the criterion of college graduation which tells us whether the aptitude measures and the high school rank are valid predictors of this criterion. Validity is the bench mark that should be used to decide whether a measure or predictor should or should not be used for a purpose that we have in mind. It is usually not possible to construct a valid test a priori. Such tests may seem valid, but validity is a matter of determination, not impression.

A test can be reliable without being valid, but a valid test must also be a reliable test. This is because measures that change by chance cannot constitute a stable predictor.

STATISTICAL INFERENCE

We often wish to characterize a population but we can seldom measure everybody in that population. We may wish to know the attitude toward the legalization of marijuana in the voting age population of the United States, but we cannot afford to ask the appropriate questions of the millions of potential voters. Hence, we resort to *sampling.* Measures of the sample are then said to characterize the population. Obviously, any bias in our sample will distort the characterization of the views of the population, and techniques are available which are designed to help us make our sample representative of the population and to avoid biasing factors in the people selected to compose the representative sample. In general, we set up samples on the basis of known characteristics of the population. Thus we know how many voters are male or female, rural or urban, black or white, young or old, and so forth. We set our sample so as to represent these characteristics of the population proportionately and then select the actual people who meet these qualifications randomly. Presidential election polls are operated in this way, and their successes demonstrate the value and utility of sampling, their failures the difficulties encountered in

Answer frame 3^{12}

1. False. Central tendency of a distribution is measured by the mean (average score), the median (middle score), and the mode (most frequent score).
2. False. Standard deviation is a measure of variation around the mean. To calculate it, you subtract each score from the mean to get deviations. Squaring them makes them all positive. The squared deviations are added together and divided by the number of cases. The square root of this average is the standard deviation. *Range* is the difference between highest and lowest score.
3. True. This feature of the normal curve enables us to state the position of a score in a distribution in terms of its deviation from the mean in units of the standard deviation. Such a *standard score* is found by computing the difference between the mean and the score and dividing it by the standard deviation.
4. False. Percentile is the proportion of people whose scores are below the value of the percentile in question. Distributions based on large enough samples of cases are often used as *norms.*

If you missed any of the above, you should restudy Frame 3^{12} before turning to Frame 4^{12} on page 80.

Frame 4^{12} continued

measuring the views of a population from those of a sample.

In experimental work, we also use samples, but in this case we wish to select comparable samples of people to whom we will do different things. To some groups experimental manipulations will be administered, to the control groups they will not be. We then must evaluate the resulting performances on some task. Did the experimental variables make a difference or not? Is the mean score of an experimental group so different from that of a control group that it could not have arisen from chance, i.e., from sampling error?

The techniques used to decide these questions involve essentially estimating the range of sample means that would be obtained by drawing a large number of samples from the population. Then we can compare the difference between the mean of our experimental group and the mean of our control group against the estimate of range of differences that would be obtained from random sampling of groups from the population. We will know from our estimates what the probability is of drawing a sample with a mean differing from the estimated population mean by a given amount. Thus we can assign a probability value to our obtained difference. If the probability value is low (say 5 times or 1 time in 100), we conclude that the obtained difference is not likely to have arisen from random sampling and thus reflects the effect of our experimental variable. If the probability is high, for example, that the difference could have arisen 10 or 20 or 50 times in the course of random sampling, then we reject the notion that our experimental manipulation had any effect. The computations followed in allowing us to reach these conclusions lead to tests such as the *critical* ratio and the *t-test.* More complex methods of analysis in this vein are *analyses of variance and covariance.* In general, we do not accept an observed difference between two groups as significant unless the probability of obtaining the difference from procedures of random sampling is low.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. The correlation coefficient is a procedure for determining whether there is a relationship between measures and its degree.

_______ 2. Correlations may be used to determine cause and effect.

______ 3. Reliability indicates the relationship between test scores and something we wish to predict from these scores.

______ 4. In general, we do not accept an observed difference between two groups as significant unless the probability of obtaining the differences from procedures of random sampling is low.

Now turn to Answer frame 4^{12} on page 84 to check your answers.

chapter 13

INTELLIGENCE

FRAME 1^{13}

In a sense, all aptitude tests, including those that measure general intelligence, are *achievement tests.* This is because to test someone we must communicate with him, and the things we ask him to do and the answers to the questions we ask him have been learned in one way or another from some aspect of experience. Achievement tests, as we usually use the term, however, measure results of specific training, as in the case of a course in introductory psychology. *Aptitude tests* tap experience which a group for which they are designed, such as high school seniors, may be presumed to have had in common. Tests of *general intelligence* are still less specific; ideally, the experiences which enable us to perform their items should be available to everyone. This assumption underlies comparisons of different groups. We can only infer ability differences (or similarities) among racial or occupational groups, for example, if their experiences have been the same. The assumption is a difficult one to justify in many comparisons of interest.

Early efforts to measure intelligence assessed simple processes, such as reaction time, sensory capacities, and discriminations. They failed. It remained for the French psychologist Alfred Binet, in collaboration with Theodore Simon, to develop a satisfactory measure of intelligence. Binet, in attempting to differentiate between successful and unsuccessful school children, devised tasks designed to measure judgment, comprehension, and reasoning. The tests were introduced in 1905, but in 1908 Binet and Simon provided a new test, in which the items, including many new ones, were grouped by age. An important criterion for selecting items in Binet's work was that many children known from their school performance to be bright should pass it, whereas few children known not to be bright should do so. Selecting items in this way, Binet was able to arrange them by age. Binet sought items that from half to three fourths of the children in one age-group would pass but that a much lower percentage of the children in the next lower age-group would pass and that an even larger proportion of the children in the next higher age-group would pass. He had made the

Answer frame 4^{12}

1. True. Positive *r*s indicate a relationship of the form that a high score on one test is associated with a high score on the other test. Negative *r*s also indicate a relationship but a high score on one test is associated with a low score on the other.
2. False. Correlation simply indicates the measures are related to some degree. It does not indicate why they are related or that one variable causes the other.
3. False. The relationship between test scores and something we wish to predict is called a validity coefficient. Reliability means that if we give the same test more than once to the same people the scores ought to be the same or nearly so.
4. True. If the probability value is low (e.g., 5 times in 100), we conclude that the obtained difference is not likely to have arisen from random sampling and reflects the effect of the experimental variable.

If you missed any of the above, you should review Frame 4^{12}. Then work Examination two on page 123 before beginning Chapter 13 on page 83.

Frame 1^{13} continued

not unreasonable assumption that intelligence increases with age. The items, then, were scaled for age. One can then calculate a *Mental Age* (MA) for a child who has been tested, by averaging the age values for the items he passes, some of which would be above, some below, and some at his *chronological age* (CA). An additional measure was introduced by W. Stern, who proposed the *Intelligence Quotient* (IQ) as a way of expressing mental development in relation to age. To compute IQ, one divides the MA by the CA and multiplies the result by 100. An IQ of 120 means, then, that a child's mental age is advanced for his chronological age, an IQ of 80 means that his MA has lagged behind his CA.

Many tests have been introduced following Binet's achievement. Among them is the well-known *Stanford-Binet Test,* developed initially by Lewis M. Terman. David Wechsler's scales, the *Wechsler Intelligence Scale for Children* and the *Wechsler Adult Intelligence Scale,* are also widely used though developed in ways different from the Binet scales. The Wechsler scales contain two parts, one requiring verbal performance and the other nonverbal performance (usually called a performance test), and IQ's can be calculated for each part. During World War I, *group testing* was developed in the U.S. Army, the resulting tests being Army Alpha (verbal) and Army Beta (performance). The Army General Classification Test (AGCT), developed during World War II, was a successor to Army Alpha.

IQ's tend to remain fairly constant over intervals of time, although occasional dramatic changes in individuals are sometimes reported. However, tests given very early in life, up to the age of two or three years, do not provide good predictions of later measurements. This is probably because the kinds of tests used at the very young ages are not like those used at the later ages.

INTELLIGENCE LEVELS

It is customary to classify parts of the IQ distribution. For example, the IQ range from 90 to 109 embraces half the population and is referred to as *average.* IQ's from 110 to 119 are classified as *high average,* from 120 to 139 as *superior,* above 140 as *very superior.* On the other side of average, the range in IQ from 80 to 89 is called *low average,* from 70 to 79 *borderline,* and below 70 *mentally retarded.* It is of interest to discuss certain of these categories in more detail.

Mental retardation. Up to 3 percent of the population of the United States is estimated to be retarded or subnormal. Some retardation is attributed by many to heredity, with the rest being associated with medical conditions such as birth injury and disorders arising during pregnancy. There are various degrees of subnormality. At IQ's below 20, almost total care and supervision are required, since the individual, even at adult ages, cannot maintain himself. He may be able to walk and show minimal speech development. With IQ's between 20 and 35, supervision is still required in a protective environment; at the adult ages, some speech is present, and daily routines and repetitive tasks can be acquired. At the next level, IQ's 36-52, there is more speech and motor development, and self-maintenance is sometimes possible under the most favorable conditions but typically is not achieved. Mild retardation, IQ's 53-69, permits education to about the sixth-grade level and, with training and supervision, self-maintenance in limited vocational and social skills can be developed.

It should be noted that sometimes people are misclassified as mentally retarded, because they have some other condition or handicap which causes low test scores. Examinations and reexaminations by skilled examiners, together with careful evaluation of the social, emotional, vocational, and educational history, are required to avoid such misclassification.

Superior ability. An extensive study of gifted children (IQ's of 140 and above) was made by Terman and his associates, who selected over 1,000 of them and followed their life histories for many years. Some of their findings were as follows: 90 percent went to college, and almost all who entered graduated. Their insanity and suicide rates were lower than those for the population in general, and their rate of divorce was less than that of the state of California, where they came from. Their earnings were much better than the average for their age-group. When the 800 men had reached the average age of 40, their records showed the publication of 67 books, 1,400 professional or technical articles, and more than 200 short stories and plays. Many had taken advanced degrees. The women had, for the most part, married and did not have professional careers. On the whole the achievements of this group of people are outstanding ones, in a sense validating the high IQ's they earned as children.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Stern's intelligence quotient (IQ) is a way of expressing mental development in relation to age.

______ 2. The average IQ falls in a range between 110 and 120.

______ 3. All people with IQ's measured at 53-69 are mentally retarded.

______ 4. Children with IQ's of 140 and above have higher suicide and divorce rates than average and are not generally successful during their lifetimes.

Now turn to Answer frame 1^{13} on page 86 to check your responses.

FRAME 2^{13}

RELATIONS OF INTELLIGENCE TEST SCORES TO OTHER VARIABLES

Test scores have been studied with respect to a number of variables, and some of the relations found are consistent with the proposition that the test scores have some validity. Other relations, however, do not bear on this issue, being concerned essentially with descriptions of how intelligence varies with other factors.

Age. Mental age, we would expect, should increase with chronological age, and, of course, this is a basic assumption of tests like those developed by Binet. Interestingly enough, however, it has been difficult to find items which differentiate age-groups in the years following the mid-teens. Consequently, it has been concluded that intelligence, in the sense in which it is measured by tests, does not increase very much after about age 16 and that it does not develop further after early maturity. If intelligence continues to develop after this point, it does so in a way not measured by intelligence tests when the items are selected on the basis of their ability to discriminate one age-group from the adjacent age-group.

Some tests work well at certain ages but not at others. For example, a maze test discriminates ages from 5 to about 10 but not ages thereafter. Evidently, beyond 10 the skills involved in maze performance do not develop further. On the other hand, we may find that older people (after 30) tend to do poorly

Answer frame 1^{13}

1. True. To compute IQ, one divides the *mental age* (MA) by the *chronological age* (CA) and multiplies the result by 100.
2. False. The IQ range from 90 to 109 embraces half the population and is referred to as average. IQ's from 110 to 119 are classified as high average.
3. False. Sometimes people are misclassified as mentally retarded because they have some condition which causes low test scores. Repeated examinations are needed to avoid such misclassifications.
4. False. In a study conducted in California it was found that children with IQ's of 140 and above had lower suicide and divorce rates than average and on the whole their achievements were outstanding during their lifetimes.

If you missed any of the above, you should restudy Frame 1^{13} before turning to Frame 2^{13} on page 85.

Frame 2^{13} continued

on tests requiring *speed;* in *power tests* (no time limits), however, scores may continue to increase beyond age 30. Changes such as these indicate that the measurement of intelligence is no simple matter.

Intelligence has been studied through most of the life-span. Two techniques have been used. One is the *cross-sectional procedure,* in which a different sample of people at each age is tested. The second is the *longitudinal method,* in which the same people are tested year after year, or after some interval.

Both methods have problems. One of the worst with the cross-sectional procedure is sampling. It is difficult to obtain comparable samples for diverse ages. With the longitudinal method sampling is also a problem, because of loss of cases from the sample, through death, disability, or moving away from the area. Also, with this method the subjects can become test-wise, thus influencing the results.

Cross-sectional studies of intelligence show a rapid rise with age but then a decline which sets in in the twenties and continues. Interestingly, the brighter subjects show a faster and more rapid development and a later onset of the decline than other subjects. Longitudinal studies, such as Terman's, do not show a decline in ability with age. A follow-up study of men tested on the Army Alpha showed no decline, either, although the interval was 31 years. One further study retested people 25 years after they were tested on entrance to college. They did better than they had as freshmen, but on the current test given to newly entering freshmen they did less well than the latter. A study known as the Berkeley growth study also fails to show a point at which intelligence test scores decline. We get different results on the decline of intelligence in later life from the two kinds of methods. It is difficult to reach a conclusion in the face of this conflicting evidence.

School success. We might expect intelligence to be related to success in school. In fact, it is, although the relation is by no means perfect, suggesting that factors other than intelligence are involved in school success. Such factors may include persistence, interests, work habits, and motivation.

Creativity. We might also expect creativity to be related to intelligence, but the correlations between measures of creativity and of intelligence are not high, though positive. It probably takes some degree of measured intelligence to be creative but above that level other factors are more important.

Intelligence has been studied in relation to race and sex, matters we discussed in Chapter 3. There we found that meaningful comparisons run afoul of many contaminating variables, including experience, schooling and cultural factors.

Occupations. In general, it is found that the abilities of people in occupations vary systematically. Thus, AGCT scores of accountants, medical students, chemists, and auditors were much higher than those of tailors, barbers, teamsters, farm workers, and lumberjacks. These relationships are probably related to the training requirements for work in these occupations.

NATURE OF INTELLIGENCE

For many years, there has been interest in the composition of intelligence; i.e., whether it is composed of *a general trait* or is *a collection of abilities.* The first view, Binet's, embraced the notion that intelligence is a general trait, represented by the many complex tasks he employed in his tests. Charles Spearman, an Englishman, however, pointed out that in addition to the general trait (g) there were also task-specific factors in the various tests, independent of intelligence itself. Later, the notion of *independent group factors,* or *primary mental abilities,* was suggested by Louis and Thelma Thurstone. Their idea was that it would be more useful to measure the primary mental abilities in a pure form, rather than to measure general intelligence which, they said, must be a complex combination of the primary abilities. There is also a view that there are four levels of factors involved in intelligence: g, group factors, specific kinds of intelligence, and task factors of the kind suggested by Spearman.

J. P. Guilford has proposed a model of intellect, different in some ways from the others. He uses factor analysis to uncover the abilities. His view is that the intellect performs *five operations* (cognition, memory, divergent thinking, convergent thinking, and evaluation), that it works on *four kinds of contents* (figural, symbolic, semantic, and behavioral), and that there are *six kinds of products,* called units, classes, relations, systems, transformations, and implications. One can visualize a cube with 120 cells (5 × 4 × 6), each representing a factor involving the combination of contents, operations, and products. Guilford is at work developing tests for each of the 120 factors but so far the task has not been completed.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. Research has shown that intelligence, as measured by tests, increases greatly after age 16 and develops further the older we get.

_______ 2. Intelligence is perfectly matched to school success.

_______ 3. People in certain occupations such as medical students and accountants have IQ's much higher than those of other occupations such as barbers and farm workers.

_______ 4. There is some question whether intelligence is composed of a general trait or is a collection of abilities.

Now turn to Answer frame 2^{13} on page 88 to check your answers.

Answer frame 2^{13}

1. False. Intelligence as measured by tests does not increase much after age 16, and if intelligence continues to develop after this point, it does so in a way not measured by intelligence tests.
2. False. The relation between IQ and school success is by no means perfect, which suggests that factors other than intelligence are involved in school success (e.g., persistence, interests, work habits, and motivation).
3. True. These relationships are probably related to the training requirements for work in these occupations.
4. True. Binet felt that intelligence was a general trait. Spearman pointed out that in addition to the general traits there were also task-specific factors. The Thurstones suggested the notion of independent group factors or primary mental abilities. Guilford is working on another model. There is no general agreement, therefore, about the nature of intelligence.

If you missed any of the above, you should review Frame 2^{13} before starting Chapter 14 below.

chapter 14

PERSONALITY AND ITS ASSESSMENT

FRAME 1^{14}

Personality is a difficult concept. One reason is that the word is used in different ways. For example, in common speech, we have phrases like "lots of personality" or "attractive personality." In such usages, we use the term to indicate an overall effect on us, usually positive or negative; one way to characterize this usage is to say that personality is someone's *social stimulus value.* However, we also use personality terms to code the consistencies in a person's behavior—so and so is "the old reliable," someone else is gentle, or aggressive, or thoughtful, or fair. Psychologists use personality in this way when they take a *trait approach,* and some use personality in the sense of social stimulus value, as we shall see. A third use is also common in psychology. This is the notion that there is a *structure or organization of characteristics* which is the personality. Such a structure can be composed of traits, but it is sometimes said to involve motives and the concept of the self. A broad definition of personality emphasizes the features and manners of behaving that characterize and determine a person's individual adjustments to the circumstances of his life. Such a definition is broad enough to encompass a variety of ways of studying personality.

PERSONALITY THEORY

Theory in this area concerns itself with consistency in behavior. It may attribute consistency to internal factors or it may rely heavily on situational determinants. It may content itself with identification of major dimensions and their interrelation or organization, or it may postulate mechanisms underlying the consistencies.

TYPE THEORY

A number of views rest on the assumption that there are relatively pure types of people, although most of us represent admixtures of the types. An old assumption is that there are types associated with bodily differences. This notion goes back at least to Hippocrates, but its fullest development is represented by the work of W. H. Sheldon. The idea is that there are three major components of body build—the *visceral organs, muscles and bones,* and the *nervous system and skin.* The components are referred to, respectively, as the *endomorphic, mesomorphic,* and *ectomorphic* components, and each one is evaluated on a scale from 1 to 7, with 7 high. All three components are present in any body, but their strength varies: a 7-1-1, for example, is strong in endomorphy and weak on the others; a 4-4-4 has mid-values on all three components. Sheldon argued that one's temperament is related to his body build. Pure types corresponding to the somatotypes are *viscerotonia, somatotonia,* and *cerebrotonia,* but, again, most people would have intermediate rankings on each one. Although Sheldon reported high correlations between somatotype and temperament ratings, methodological shortcomings were present in his studies, and current opinion does not support the relation between measurement of bodily components and temperament.

Another typology, proposed by Hans Eysenck, holds that two dimensions of personality can account for many aspects of personality. One is *extroversion-introversion* and the other is *stable-unstable* (or normal and neurotic). These dimensions, of course, are combined to yield major types. Extroversion refers to sociability, outgoingness, an orientation to people, whereas introversion means withdrawal, shyness, preference for being alone. Stability means that the emotions are well controlled and not aroused easily, whereas instability refers to the opposite. Although Eysenck has been able to show differences in laboratory tasks among people classified in terms of his dimensions, his theory has not led, in the opinion of many, to a satisfactory general account of personality. He tends to stress biological inheritance and to overlook social and cultural factors.

TRAIT THEORY

This kind of theory attempts to define and measure traits and to determine their interrelationships. For example, R. B. Cattell has distinguished *surface and source traits* by the following steps. There are nearly 18,000 words in the English language which can be used to differentiate one person's behavior from that of another. Cattell studied this list and, by eliminating terms with overlapping meanings, reduced it to 171 personality variables. Cattell developed measures of these variables and obtained their intercorrelations. *Surface traits* are defined by clusters of variables and when measured intercorrelate at a high level. An example of a highly intercorrelated set is given by the following: Honest versus dishonest, loyal versus fickle, fair-minded versus partial. The cluster is named integrity and altruism versus dishonesty and undependability. Factor analysis of the intercorrelations yielded underlying traits called *source traits.* Cattell has found 16 source traits, such as surgency-desurgency, which represents such attributes as cheerfulness versus depression, sociability versus seclusiveness, high energy versus languidness. Many theorists feel, however, that Cattell's approach neglects the organization of personality and the situational variables important to the manifestation of a trait in behavior.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Personality theory is concerned with consistency in behavior.

______ 2. Current research shows that there is a direct relation between body type and temperament.

______ 3. It is generally agreed that two dimensions of personality (extroversion-introversion and stable-unstable) account for most aspects of personality.

______ 4. Personality is generally believed to be measurable by looking for certain traits known as source traits.

Now turn to Answer frame 1^{14} on page 92 to check your responses.

FRAME 2^{14}

PSYCHOANALYTIC THEORIES

We mentioned, in Chapter 4, the psychosexual developmental stages postulated in Freud's theory and the notion of fixation at a stage. Freud suggested what are essentially personality types, each associated with a degree of fixation on one or the other developmental stage. Thus, we might speak of an *oral personality* or an *anal personality.* The latter would be characterized by compulsive traits—exaggerated cleanliness, obstinacy, stinginess. Traits of the oral personality include greediness, dependency, and passivity. In the original formulation, cleanliness training during the anal period and frustration in the nursing period were believed to be important determiners of the fixations leading to the appearance of these personality types, but later theorists emphasize the total interaction of parent and child, suggesting that the compulsive traits, for example, arise because the parents demand conformity, punctuality, neatness, and precision as well as cleanliness. There is some support for this view in empirical studies of stinginess, orderliness, and obstinacy, i.e., in adults these characteristics are intercorrelated but other psychoanalytic writers have emphasized other factors in the development of personality. Adler emphasized the striving for superiority, Jung, extroversion and introversion. More recent writers have seen behavioral traits as ways developed to cope with anxiety or as means for serving human needs such as that for relatedness with others. The notion of fixation is largely discarded in these accounts. We shall have something to say about the dynamic aspects of psychoanalytic theory in the next chapter.

SITUATIONAL THEORIES

An alternative to the suggestion of types, traits, and underlying factors such as motives is to explain the consistency in behavior, when it occurs, by stressing *environmental stability.* On this view, one would not expect consistency when the situation changes. Many years ago a study by Hartshorne and May seemed to support the situational determination of honesty. The investigators found that cheating, for example, would not be shown by a given child in all situations but rather only in some situations. The child might cheat in the classroom but not in games on the playground.

Situational determinants of consistency have been integrated into a learning interpretation. Thus, one could argue that certain behaviors are learned in a situation. Whether they will appear also in another situation will depend on whether the new situation is similar to the one in which the learning took place. Reinforcement and generalization are important features of a learning theory applied to personality, and these views tend to ignore contributions made by bodily characteristics (e.g., a 97-pound weakling is unlikely to play defensive lineman on a professional football team) and such integrative mechanisms as the self-concept.

The foregoing brief review indicates that there is much disagreement among personality theorists. One reason for this is that measures of personality, a topic to which we turn now, have not been very successful. In the absence of valid measurement, it is not easy to conduct clear tests of the virtues of competing theories.

PERSONALITY MEASUREMENT

A variety of characteristics related to personality have been measured. Included are values, styles, interests, traits, motives, and the self-concept. The techniques used are also varied: questionnaires or inventories, interviews, projective tests, and behavioral observation.

Inventories. These consist of a series of statements or questions administered in printed form, which the person completes by selecting from alternative answers, by indicating agreement or disagreement, or by judging the applicability of statements to himself. There are many inventories, and we can mention but a few here. One widely used inventory is the Minnesota Multiphasic Personality Inventory (MMPI), which consists of almost 500 statements. The person checks each one as true or false for him, and his answers are scored by means of various keys based on the response patterns of people with known symptom-syndromes: psychopathic deviation, depression, hysteria, hypochondriasis, schizophrenia, and others. A profile can then be constructed for an individual showing, by means of standard scores, his status on each of the variables. Both Cattell and Eysenck have developed questionnaires, the former to measure the 16 source traits, the latter to assess the two dimensions postulated in his typology. Allen Edwards' Personal Preference Schedule makes use of a forced-choice technique. In this procedure, the person must choose between two statements, both of which are favorable or unfavorable. Presumably, the alternative he chooses represents his preference and over a series of choices consistent selection provides an index of a motive for the subject. Edwards' scale gets at 15 motives from Henry Murray's list. Murray proposed a list of human needs (or motives), among them achievement, affiliation, dominance and aggression.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Most personality theorists accept Freud's ideas about personality types, which are associated with a degree of fixation in some developmental stage.

______ 2. There is some evidence to support the idea that consistency in behavior is due to environmental stability.

______ 3. In general, measures of personality have been very successful.

______ 4. There are many personality inventories that are used to measure the personalities of individuals.

Now turn to Answer frame 2^{14} on page 92 to check your answers.

FRAME 3^{14}

Interview. Many people find it sensible that the face-to-face interaction of an interview be used in personality assessment. An interview is, of course, "a conversation with a purpose," and the purpose can be informative, information-seeking (as in the case history taken in clinics and hospitals), and evaluative. Some interviews follow a standard set of questions, i.e., they are structured, whereas others are unstructured and give the interviewee much latitude in what he discusses. Personality assessments by means of the interview are often made through *rating scales,* in which the interviewer marks a place on a printed scale indicative of the amount of some trait that he thinks the interviewee has. Interviewers must guard against the *"halo effect,"* i.e., having been impressed favorably (or unfavorably) by one feature of the interviewee, their judgments on other aspects are influenced by this impression.

Projective tests. Personality inventories and questionnaires are examples of *structured tests,* because they ask definite questions or include clear-cut statements, and the respondent must respond to each one by selecting an answer or by making one of a limited number of judgments. *Projective tests* are *unstruc-*

Answer frame 1[14]

1. True. It may attribute consistency to internal factors or it may rely heavily on situational determinants. It may content itself with identification of major dimensions and their interrelation or it may postulate mechanisms underlying the consistencies.
2. False. Although Sheldon reported high correlations between somatotype and temperament ratings, his studies had methodological shortcomings and current opinion does not support the relation between bodily measurement and temperament.
3. False. Although Eysenck has been able to show differences in laboratory tasks among people classified in two dimensions, his theory has not led to a generally satisfactory account of personality.
4. False. Many theorists feel that trait analysis such as that done by Cattell neglects the organization of personality and the situational variables important to the manifestation of a trait in behavior.

If you missed any of the above, you should restudy Frame 1[14] before turning to Frame 2[14] on page 90.

Frame 2[14] continued

Answer frame 2[14]

1. False. There is some support for Freud's concepts, but other writers have emphasized different factors. Adler emphasized the striving for superiority; Jung stressed extroversion and introversion. More recent writers discard the notion of fixation as presented by Freud.
2. True. Hartshorne and May, for example, seemed to support situational determination in studies of honesty. The investigators found that cheating would not be shown by a child in all situations but rather, only in some situations.
3. False. Personality measurement has not been very successful, and, in the absence of valid measurement, it is not easy to conduct clear tests on the virtues of the various theories.
4. True. One widely used inventory is the 500 statement Minnesota Multiphasic Personality Inventory. Another is Allen Edwards' Personal Preference Schedule. Both Cattell and Eysenck have also developed questionnaires.

If you missed any of the above, you should review Frame 2[14] before turning to Frame 3[14] on page 91.

Frame 3[14] continued

tured. Their stimuli may be inkblots (Rorschach Test) or pictures capable of more than one interpretation (Thematic Apperception Test or TAT). The person gives whatever answer (what he sees in the blot, what is going on in the picture) he thinks appropriate.

In the TAT, the stories produced are scored for themes indicative of various motives (e.g., achievement, affiliation). In the Rorschach, responses are scored for their location in the blot, their form, whether they have movement, and for their content. One interpretation of a Rorschach response pattern indicating that the subject used mainly small parts of the blot to respond to might be that he is compulsive and concerned with small detail.

Observation. A procedure for assessing personality is to observe an individual as he performs a task, usually one involving interaction with others and often under stress. Ratings by peers and by examiners are obtained. When the behavior samples used for assessment resemble closely the performances to be predicted, such procedures have considerable validity. As measures of general personality characteristics, however, they are not so successful.

Experimental situations. Certain situations have been found to reveal styles of performance. One such style is *field independence and dependence*, another is *leveling and sharpening,* and a third is *repression and sensitization.* In testing for the first one of these, judgments of verticality are elicited by means of the Rod and Frame Test. This procedure presents the subject with a rod enclosed in a frame and asks the subject to judge the verticality of the rod. The frame can be rotated, and some subjects, who are field-dependent, judge the verticality of the rod according to the position of the frame, whereas others, who are field-independent, do not let their judgments be influenced by the position of the frame. A Hidden Figures test also measures this style, those who can find figures embedded in another one readily being field-independent. Field-dependent people tend to be, in comparison with field-independent people, passive, dependent, submissive, anxious, and low in self-esteem, among other characteristics.

Evaluation of personality assessment. There is not much one can say for one way of assessing personality over any other method. All of them seem to have some validity but none has very high validity. This is true not only for inventories but also for interviews and projective tests. Personality assessment has a long way to go to become even as effective as intellectual measurement.

It should be noted that in areas of relatively delimited scope, some success has been achieved. For example, *the Strong Vocational Interest Blank* asks the subject to express his likes and dislikes by responding to a long list of items concerning amusements, school subjects, kinds of people, and the like. These items were administered to persons known to be successful in various fields, and scoring keys for these fields were developed. Essentially, the pattern of likes and dislikes of an individual is compared with the keys for the various fields. If his interest pattern fits with that of people in a field, his chances of being happy and satisfied in that field are much better than if his interests are discrepant from those who work in it.

Comparisons have been made of the predictive value of assessments made by clinical methods (interviews, for example) and those made by tests and inventories. Usually, statistical predictions made by formula incorporating data from the latter have been more accurate than clinical predictions. This result, of course, does not deny the value of clinical methods in relation to counseling and treatment.

SHAPING OF PERSONALITY

It is reasonable to assume that a host of factors, many of them specific or unique to each individual, enter into the forming of personality. Among these factors are inborn physical endowment, ability, and experiences in the family and in other social situations. Cultural and class differences in personality are easy to discover. We discussed some of these sources of variation in Chapter 4. Perhaps, in the face of the diverse influences on personality, it is no wonder that assessment of it is no better than it is.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. The "halo effect" in interviews means that the interviewer is always favorable to someone who impresses him initially.

______ 2. While personality inventories and questionnaires are structured tests, projective tests are unstructured.

______ 3. There is no one way of measuring personality that is obviously superior to the others.

______ 4. It is reasonable to assume that many factors which are specific or unique to each individual enter into the forming of personality.

Now turn to Answer frame 3^{14} on page 94 to check your answers.

Answer frame 3^{14}

1. False. The "halo effect" may be a favorable *or* unfavorable overall impression created by one feature of the interviewee.
2. True. Their stimuli may be inkblots (Rorschach test) or pictures capable of more than one interpretation (Thematic Apperception Test).
3. True. All of them seem to have some validity, but none has very high validity. This is true not only for inventories but also for interviews and projective tests. Some success has been made in areas of relatively delimited scope (e.g., the Strong Vocational Interest Blank).
4. True. Among these factors are inborn physical endowment, ability, and experiences in the family and in other social situations.

If you missed any of the above, you should review Frame 3^{14} before beginning Chapter 15 below.

chapter 15

CONFLICT, FRUSTRATION, AND DEFENSE MECHANISMS

FRAME 1^{15}

It is probably from psychoanalysis that the importance of conflict came to be recognized. Freud spoke of the neurotic conflict, one arising from the need to express an instinctive energy (e.g., a sexual or an aggressive act) and the anxiety arising over such expression in the ego, due to the prohibitions of the superego. Such conflicts, Freud thought, were at the base of neurosis, and Anna Freud, his daughter, pointed out the many *mechanisms of "defense,"* which function to permit some release of the instinctual energy, while disguising the fact of its release. It is now widely agreed that conflict and defense mechanisms underlie much normal behavior and that it is only the extreme forms of conflict and defense that are neurotic. A state of conflict is frustrating, as is any impediment to reaching a goal. In this chapter we will discuss conflict and frustration and then turn to the defense mechanisms.

CONFLICT

The analysis of conflict has yielded agreement that we can identify three more or less pure forms, although, of course, real-life conflicts may involve admixtures of the three. The types of conflict are identified in terms of the incentives among which we must choose. For example, we can have a conflict, usually easily resolved, over which of two positive incentives to choose, such as which of two desirable courses to elect when they are scheduled to meet at the same time. Such *approach-approach conflicts* can be difficult to resolve, as would be the case when the choice of one incentive means that the other one will be lost. Thus, one of the two courses may have to be chosen as one enters the last term of his senior year. The one not selected, then, is permanently lost, and this kind of conflict situation is called a *double-approach-avoidance conflict.* Another kind of conflict is *avoidance-avoidance* in which both alternative choices are unattractive. A child, required to eat an undesired food or to go to bed early is in an avoidance-avoidance conflict. He will try to escape the situation, by delaying the choice as long as possible.

Approach-avoidance conflicts arise in the case where there is a desirable goal but, at the same time, obtaining the goal has undesirable features. Consider the case of a child who wishes to obtain a colorful ball which is in the water near the edge of the beach and who is afraid of the water and the waves. The child will approach the ball but stop short of the water. He may run toward the ball but retreat when a wave rolls in. Such conflicts have received theoretical analysis and experimental study. One can imagine that there is a *gradient of approach;* i.e., one will move more strongly toward the goal the closer he is to it. But there is also a *gradient of avoidance,* the tendency to retreat being greater the nearer one is to the feared aspect of the goal. If the gradient of avoidance is steeper than that for approach, the two gradients will intersect, and approach should cease at their intersection and be replaced by vacillatory behavior. This interpretation has been tested with rats, which were first taught to traverse a runway to food. Later, they received electric shock in the food area. Measurements of the force the animals exerted in approach and in avoidance showed both gradients and that the one for avoidance is steeper than that for approach. Vacillatory behavior was observed. Each of these gradients can be shifted by changes in hunger or in shock. The hungrier the animal is, with shock strength constant, the closer he will approach the goal. With hunger high and shock weak, the animal may get to the food but show fear or anxiety as he approaches and as he eats the food. It is not difficult to find parallels to this situation in the experience and behavior of human beings. Children often show conflict between the desire to be independent and that for dependence. We may experience conflict between cooperating with someone versus competing with him. We often have conflict over what we would like to do and the moral or legal consequences of doing so. Conflict is a pervasive feature of life in a complex society.

FRUSTRATION

This word is used here to mean that achievement of a desired goal is thwarted. Conflict can obviously be frustrating in this sense, but there are many other sources of frustration, such as physical barriers, personal deficiencies, and uncooperative social arrangements. The sources of frustration are legion. What kinds of reactions does frustration produce?

One reaction is *restless behavior* and signs of *unhappiness.* Sometimes *rage* occurs, with attendant *aggressive* and *destructive reactions.* The aggression may be directed toward the source of the frustration, but it may be *displaced,* as when one is hostile toward his wife and children rather than toward his supervisor; the supervisor may be too powerful and fear-arousing for aggression to be expressed directly toward him. Scapegoating and prejudice toward minority groups may be manifestations of displaced aggression.

On the other hand, *apathy* and *depression* sometimes accompany frustration, especially when the frustration is chronic and there seems to be no hope of overcoming it. This kind of reaction occurred in prisoners held in Nazi concentration camps. Fantasy is another reaction to frustration, the solution to the frustration being reached in imagination. One accompaniment of frustration is especially maladaptive: This is reacting in a *stereotyped way,* one which has failed in the past. Yet rats have been shown to continue to make a fixed, stereotyped response after frustration, even though the problem could be solved readily were they to vary their reactions.

In one experiment, children were frustrated by being prevented from playing with very attractive toys which were visible behind a screen. Their behavior with the toys they had, as compared with the behavior with the same toys in the absence of frustration, became more *primitive,* i.e., it resembled the behavior of younger children. This is a kind of *regression,* although in this case it was probably not a reversion to ways the children themselves had behaved in the past but rather simply a *primitivization.*

DEFENSE MECHANISMS

In extreme form some of these mechanisms characterize neurosis, but all of them, in milder form, are familiar to us because we and other people use them. Basically, the defenses are ways of deceiving ourselves as to the reasons underlying our conduct. They protect the self from awareness of the motives, which are expressed in behavior, by *denial* and by *disguise.* We shall start with disguise, reserving one of the mechanisms which employs disguise, however, to the end of the chapter for the reasons indicated there.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. Most conflict and defense mechanisms are forms of neurotic behavior.

_______ 2. The analysis of conflict has yielded agreement that we can identify three more or less pure forms.

_______ 3. Frustration always leads to restless behavior and signs of unhappiness.

_______ 4. Defense mechanisms are deceptive ways of behavior that are sure signs of neurosis.

Now turn to Answer frame 1^{15} on page 98 to check your responses.

FRAME 2^{15}

Rationalization. When we give seemingly good reasons for our conduct, but not the real reasons, we engage in rationalization. We may rationalize the purchase of a new car (which we really wish to buy) by saying that the old one would require very expensive repairs. We may be convinced that the reason we give is the true one, although others may see through the disguise we have provided for ourselves.

Projection. We may escape awareness of undesirable traits in ourselves by assigning them to others in excessive degrees. If we wish to express hostility but do not wish to acknowledge our hostility to ourselves, we can justify it by believing that others are hostile to us. Thus, our own hostility is acceptable because it is elicited by others rather than being a trait of ours. Projection receives confirmation in experiments which show that people who have an undesirable trait (e.g., stinginess, disorderliness, obstinacy) of which they are not aware do see the trait in others.

Reaction-formation. This mechanism disguises a trait or motive by leading the person to behave in a way opposite to that called for by the trait or motive. An example is provided by the person who would really like to see pornographic movies and pictures and read books and magazines of pornographic content. In his behavior, however, he rejects pornography, refuses to go to "dirty" movies or to read "dirty" books and may vote for strict censorship of both.

One must be careful in attributing reaction formation (or any other defense mechanism) to someone. Many reasons we give for our conduct are true ones, and the average person does not usually possess enough information about another to infer reasons for conduct that the other person may be disguising through a defense mechanism.

Dissociation. We can avoid unwanted affect by separating an action from the emotion which underlies it. One way of doing so is by *compulsive movements.* If underneath one wishes to express aggression through hitting others but does not wish to acknowledge the feeling or to run the risk of striking others, a compulsive movement such as pounding the palm of one hand with the fist might serve to avoid both the affect and the action. The movement would be a repetitive one, especially in the presence of others, but we would become aware of its significance only if it were prevented. Then we would become tense and uncomfortable.

Another way of dissociating *affect* and action is excessive theorizing, sometimes referred to as *intel-*

lectualization. If we talk instead of act, or theorize or debate, we can avoid the emotion which, if experienced, would upset us and might lead to action which we fear to take.

Repression. We can deny an impulse or an experience by means of this mechanism. Repression means a total forgetting or denial that a motive exists and may include the behavior and experiences that were associated with the motive. This is not suppression. The latter is a conscious process; we decide to suppress a memory or a motive. But we do not consciously use repression. Some amnesias are illustrative of repression; they arise from the fact that a behavioral episode is unacceptable to us. Hence, we deny their occurrence by forgetting them altogether. Of course, repression is not always this severe, and the phrase *"motivated forgetting"* may be a more apt name for our forgetting of things which are unpleasant to remember.

Substitution. This mechanism is one of disguise, but it is placed here rather than earlier because it is a successful defense which replaces the troublesome motive with another acceptable one. This is called *sublimation* and is exemplified by the expression of hostility in a socially approved way as in boxing, wrestling, or other sports requiring aggressiveness. *Compensation* is another form of substitution, in which failure in one activity is made up for by diligent practice of and success in another one. *Overcompensation,* however, refers to making up a deficiency by becoming expert in the activity in which one was originally deficient. Theodore Roosevelt, originally a rather frail youth, overcompensated for this fact by stressing boxing, outdoor activities such as hunting, and leading a group called the Rough Riders in the Spanish-American War.

COMMENT

It is common for the student, reading a chapter on defense mechanisms, to identify many of them in his own conduct and to feel abnormal, as a result. We stress once again that defense mechanisms are used by everyone and that therefore they can hardly be regarded as abnormal. Their use may lead to a more effective solution to frustration and conflict, because they give us time to consider other alternatives and permit experimentation with roles we have not tried before. Careful self-examination may reveal the presence of defense mechanisms, but this revelation can be the basis of a more effective understanding of the factors involved in our frustrations and conflicts.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. When we give seemingly good reasons for our conduct, but not the real reasons, we are rationalizing.

______ 2. People who are against pornography and other such materials are using a defense mechanism called reaction-formation to hide their true feelings.

______ 3. Suppression means a total forgetting or denial that a motive exists.

______ 4. Substitution is a successful defense mechanism which expresses a troublesome motive in an acceptable way.

Now turn to Answer frame 2^{15} on page 98 to check your answers.

Answer frame 1^{15}

1. False. It is widely agreed that conflict and defense mechanisms underlie much normal behavior and that only the extreme forms of conflict and defense are neurotic.
2. True. The three rather pure forms are: approach-approach, avoidance-avoidance, and approach-avoidance.
3. False. Frustration produces many kinds of actions. One reaction is restless behavior and unhappiness. Another is rage. On the other hand, apathy and depression sometimes accompany frustration. Fantasy is another reaction.
4. False. In extreme form, some defense mechanisms characterize neurosis, but all of them, in milder form, are familiar to us because we all use them. They protect the self from awareness of motives, which are expressed in behavior, by denial, and by disguise.

If you missed any of the above, you should restudy Frame 1^{15} before turning to Frame 2^{15} on page 96.

Answer frame 2^{15}

1. True. We may be convinced that the reason we give is the true one, although others may see through the disguise we use.
2. False. One must be careful in attributing reaction formation to others. Many reasons we give for our conduct are real ones, and the average person does not possess enough information about another to infer reasons for conduct by proposing that some sort of defense mechanism is in force.
3. False. Suppression is a conscious process. A total forgetting or denial that a motive exists is called repression.
4. True. Sublimation, for example, is exemplified by the expression of hostility in a socially approved way as in some sports. Compensation is expressed when failure in one activity is made up for by diligent practice and success in another. *Overcompensation,* however, refers to making up a deficiency by becoming an expert in the activity.

If you missed any of the above, you should review Frame 2^{15} before beginning Chapter 16 on page 99.

chapter 16

DISORDERS OF BEHAVIOR

FRAME 1^{16}

The defense mechanisms, we suggested, represent attempts to cope with anxiety. Sometimes they fail, and coping processes seek other means of dealing with anxiety. Some of these are called neuroses, others psychoses. We think of these terms as denoting *abnormality*, but the concept of abnormality is not an entirely clear one. The reason, in part, is that what is considered abnormal in some groups or societies is considered to be normal in others. We sometimes think of the abnormal as meaning the extremes of a distribution, i.e., the abnormal is statistically infrequent. But this statistical meaning does not satisfy us either. The extremely intelligent person is infrequent statistically, but we should hesitate to call him abnormal. Probably the most meaningful conception of abnormality is *degree of impairment.* A person is impaired if he does not meet the usual criteria for successful adjustment. These are that he is productive; that he can form good relationships with other people; that he has knowledge and acceptance of himself. Also, that he perceives reality effectively and thinks fairly rationally. Abnormality is usually the lack of one or more of these characteristics to a major degree.

Many writers feel that abnormal behavior and normal behavior fall on a continuum; i.e., they are not discrete or separate classes or categories. One blends into the other. This is easy to see in comparing defense mechanisms and neuroses, but it is also thought to be true of psychoses; they are more extreme deviations than neuroses.

Mental disorders are prevalent. We know that there are, at any one time, around 750,000 people hospitalized for mental disorders in the United States, and estimates made in community studies have asserted that as many as one third of the population has some disturbance of mental or emotional health. Most of these disorders, of course, are neuroses or even less severe disturbances, but their presence interferes to some degree with daily life. Few neurotics enter hospitals, so that the hospital population is composed mainly of severely disturbed or psychotic patients. Almost a quarter of these patients have mental disorders arising from old age, and their stay in the hospital is relatively brief because of their high death rate. On the other hand, schizophrenic patients are typically young on admission, so that their stay in the hospital is long; they constitute half the patients hospitalized.

NEUROSIS OR PSYCHONEUROSIS

In some neuroses, anxiety is a prominent symptom, but while anxiety may underlie other neuroses its presence is usually masked by other symptoms. There are many kinds of *neuroses*, but we restrict ourselves to six common ones.

Anxiety neurosis. This reaction is characterized by chronic uneasiness, apprehension, dread, often accompanied by anxiety attacks of greater or lesser frequency. Physiological symptoms are common, but the person does not know what he is afraid of or what the sources of his disturbance are. Sometimes this is referred to as "free-floating" anxiety; i.e., it is not restricted to particular situations but can occur almost anywhere. In many cases suppressed hostile or sexual reactions underlie the anxiety, but the person who experiences the anxiety does not see the connection between these motives (of which he is unaware) and his anxiety.

Phobic reactions. In phobias there are also fears and anxiety, but the reaction is circumscribed; i.e., it occurs in relatively specific classes of situations and not otherwise. The extreme fear of high places (acrophobia), of small, enclosed places (claustrophobia), of animals, crowds, and the like are illustrative. The feared situation is usually symbolic of something else, such as the expression of sexual reactions. Thus, one woman who was severely afraid of walking alone on the street was really afraid of her sexual feelings toward men she might encounter; she had been taught that such feelings are bad and sinful, and her avoidance of walking alone, caused by her phobia, protected her from feeling sexual impulses to which, she feared, she might give in.

Dissociative reactions. These are characterized by loss of awareness of the self or some aspect of it. Thus, an amnesia for a period in one's life, an amnesia not caused by injury, is an example. Amnesias accompanied by flight and wandering are called *fugues.* Multiple personalities, such as the one described in the *Three Faces of Eve,* are disorders of the dissociative kind. Repression seems to be the mechanism here, as can be seen in amnesias which may arise after the individual has done something which brings on massive anxiety and guilt. The amnesia removes the episode from awareness, though it is not permanently lost from memory, and the fugue is sometimes a way of escaping from being reminded of the episode by leaving the situation altogether.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Most writers feel that abnormal behavior is clearly different from normal behavior.

______ 2. Most neurotic patients are in hospitals.

______ 3. Anxiety neurosis is characterized by chronic uneasiness, apprehension, dread, often accompanied by anxiety attacks.

______ 4. Dissociative reactions are characterized by loss of awareness of the self or some aspect of it (e.g., amnesia not caused by injury).

Now turn to Answer frame 1^{16} on page 102 to check your responses.

FRAME 2^{16}

Conversion reactions. These have also been known as *hysteria,* and they consist of an organic symptom which has no physical cause. Sometimes these take the form of an anesthesia of a part of the body or of paralyses. That these are real and not feigned can be shown in an anesthesia, for example, by sticking a pin in the affected area; there is no normal reaction of pain. Other conversion reactions may include seizures and visceral disorders. All of these reactions can apparently prevent anxiety, and the classical hysteric was said to show "la belle indifférence des hystériques," i.e., he did not seem to be much concerned about his complaint. Presumably, this is because the disorder protected him from anxiety and, of course, it also provided secondary gains—benefits such as being excused from work or school, being cared for, and avoiding unpleasant tasks and duties. Dramatic hysterical reactions, such as anesthesias and paralyses, are reported to be less frequent today than they used to be, perhaps because of the greater sophistication of the populace about medical conditions and psychological disorders.

Obsessive-compulsive neuroses. These disorders represent an exaggeration of the defense mechanism discussed in the last chapter. Obsessive thoughts, compulsive behaviors, and combinations of the two indicate the symptoms of this neurosis. Excessive hand-washing, for example, may arise because of an obsession with germs, and when severe enough can effectively hinder the living of a normal life. The symptom again protects the person from anxiety, and the prevention of his compulsive ritual will likely bring on great discomfort and tension.

Depressive reaction. This is a *reactive depression;*

i.e., the person responds to a loss or disappointment more severely than most people. He appears sad and apathetic and has feelings of guilt and self-depreciation. There may be difficulties in sleeping, concentration, and getting around to doing anything. Usually, people recover spontaneously from these depressions, which are relatively short in duration, but suicide is a possible course of action in depressions of this sort.

Comment. The neurotic reactions are not always easy to differentiate from one another, but they do differ in the amount of observable anxiety they show. They probably arise because of frustration and anxiety arising from unresolved conflicts, and many writers point to childhood experiences and family difficulties as their sources. Presumably an individual "chooses" his neurotic pattern on the basis of the ways he adjusted himself to the demands of his parents and others in early life. The tendency, then, is to think of neuroses as acquired through learning, and there are various theories of neurosis which stem from Freud and other writers influenced by him. A few investigators have suggested that there is a hereditary component to neurosis, but present evidence is insufficient to establish that this is so. At best, heredity would constitute only one factor in causation, interacting with environmental pressures to cause the disorder.

PSYCHOSES

Neuroses can be disabling, but they do not represent as extreme a disorder as *psychoses.* In a psychotic state, the person is likely to be severely disturbed. He may distort or break with reality, hearing voices when no one is speaking or seeing things that others do not see *(hallucinations).* He may harbor bizarre beliefs *(delusions),* such, for example, as that he is the victim of an international plot or that he is God or Jesus Christ, and the like. Speech may be disturbed, so that the flow of words doesn't seem to make sense, and thinking may not follow orderly, logical paths. There are often *emotional disturbances,* such as withdrawal from people and lack of affect or the presence of affect that is inappropriate to the situation. Symptoms such as these should suggest the severity of the psychotic state. However, not all psychotics show all these manifestations, and in many the manifestations will appear only occasionally, in times of stress, for example.

Psychoses may be classed into two broad kinds, with overlapping symptoms. One kind is that associated with *a disorder of the body,* such as damage to the brain resulting from alcoholism or from invasion of the brain by the syphilitic spirochete. Disorders of old age are often accompanied by brain damage resulting from arteriosclerosis, for example. This kind of psychosis is called *organic,* in contrast to the other kind, called the *functional psychoses.* The latter are not associated with a bodily disturbance, although it is possible that organic bases may yet be found. At one time, general paresis, the disorder now known to be due to syphilis, was considered to be a functional disorder.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ Conversion reactions, which are also known as hysteria, consist of an organic symptom which has no physical cause.

______ 2. Obsessive-compulsive neuroses are characterized by persons who respond to a loss or a disappointment more severely than most people.

______ 3. Neuroses are not as extreme a disorder as psychoses.

______ 4. Psychoses may be either organic (associated with a disorder of the body) or functional.

Now turn to Answer frame 2^{16} on page 102 to check your answers.

Answer frame 1^{16}

1. False. Normal and abnormal are not discrete classes or categories. One blends into the other.
2. False. Few neurotics enter hospitals. The hospital population is composed mainly of severely disturbed or psychotic patients.
3. True. In phobias there are also fears and anxiety, but the reaction is circumscribed—that is, it occurs in specific situations and not in others (e.g., fear of high places, known as acrophobia).
4. True. Multiple personalities, such as the ones described in the *Three Faces of Eve,* are disorders of the dissociative kind. Amnesia is another example.

If you missed any of the above, you should restudy Frame 1^{16} before turning to Frame 2^{16} on page 100.

Answer frame 2^{16}

1. True. Sometimes these take the form of anesthesia of a part of the body or of paralyses. Other reactions include seizures and visceral disorders. All of these reactions can apparently prevent anxiety.
2. False. Obsessive thoughts, compulsive behaviors, and combinations of the two are the symptoms of obsessive-compulsive neuroses. Depressive reaction is an over-response to a loss or disappointment.
3. True. In a psychotic state, a person may distort or break with reality, hearing voices when no one is speaking, and so forth. In many psychotics, however, manifestations will appear only occasionally, in times of stress, for example.
4. True. Disorders of the body may be caused by damage to the brain from alcoholism or from invasion of the brain by the syphilitic spirochete.

If you missed any of the above, you should review Frame 2^{16} before beginning Frame 3^{16} below.

FRAME 3^{16}

PSYCHOSES *(continued)*

There are many differentiations that can be and are made among psychoses, but we can consider only the most important functional disorders here. These are the manic-depressive and the schizophrenic reactions.

Manic-depressive disorders. These are disorders of mood but the disorder is not constant. For example, a patient may go into a manic phase, from an apparently normal period, and after a time the mania may abate. Mania is characterized by excitement and elation. The patient is continually active, may pace around, sing, shout, talk volubly, and scream. He is likely to have hallucinations and delusions and is often confused and disoriented. Moral inhibitions may be relaxed. Water baths (hydrotherapy) and sedation are often necessary to cope with a patient in a manic phase.

Patients may also enter a depressed phase from a normal period, and there are occasional patients who have both manic and depressive phases, sometimes interspersed with relatively normal periods. In depression, the individual seems to be very slow, mentally and physically, he has little self-esteem, life seems hopeless to him, and he has many feelings of guilt and worthlessness. Suicide is a risk. In severe depression, the patient requires care, not only to avoid suicide but also to assure that he does not starve or otherwise come to harm.

There is reason to suspect a hereditary factor in these disorders, but there are also psychological views as to their nature. The manic phase is sometimes said to constitute ways of avoiding the feelings of worthlessness and inadequacy. Depression is thought to be associated with failure to meet the patient's high standards for himself, both moral and for achievement. These standards are set so high that no one could meet them, but the patient will deprecate such achievements as he has managed, being unwilling to accept them as evidence of his worth or adequacy.

Schizophrenic reactions. The term *schizophrenia* means split mind, referring to a divorce between thought and emotion, rather than to multiple personality as is sometimes thought. There are many symptoms in schizophrenia, and attempts have been made to classify them into types. However, it will not be worthwhile here to attempt to describe these types, as their differentiation is often difficult. It is perhaps better to say that most of the symptoms introduced at the beginning of the section on psychoses are found in schizophrenia. Thus, the schizophrenic's emotions seem inappropriate when they are not dulled. He seems to have little interest in people and to withdraw from them. He is absorbed in his own fantasy life (autism). He shows peculiar gestures and grimaces, probably related to his fantasies. One can be puzzled by the incoherence in his speech, which may include new words (neologisms), and he may show an apparent decline in ability. Auditory hallucinations are prominent, the voices often being accusatory. He has delusions that his thoughts are under the control of others and that he is being persecuted. One kind of schizophrenia, the *paranoid* type, is characterized by delusions of persecution. Projection has been suggested as the mechanism underlying paranoia. The paranoid patient is suspicious of others, claims that he is being poisoned or followed, or watched through the TV set, and the like.

Causes of schizophrenia. Some schizophrenics have a long history of withdrawal from others and poor adjustment, whereas others have shown a reasonably good adjustment up to the time of some event which precipitated the disorder. The terms *process* and *reactive* schizophrenia are applied to these kinds, respectively, but they are not clearly differentiated. However, it is possible that the causes of the two kinds differ. Certainly, the reactive schizophrenics have a better chance of recovery than the process schizophrenics.

Most of the work on causes of schizophrenia has centered on three factors: *hereditary, biochemical,* and *psychological.* We summarized the work on hereditary factors in an earlier chapter. Biochemical factors are suspected but not at present proved as causative agents. Early interest in LSD and other hallucinogenic drugs was occasioned by the resemblance of the effects of such drugs to those seen in schizophrenia. However, little advance has attended the recognition of the parallel. Many investigators believe that the nature of schizophrenia can be uncovered by biochemistry, but this hope has not yet been realized. It is worth noting that single causes of schizophrenia have been proposed from time to time for many years. Despite the early promise such causes have seemed to have, none of them has stood the test of careful evaluation.

Psychological causes have been sought in parent-child relations in the early lives of schizophrenic patients, but the results have not been clear, consistent, or easily interpretable. A characterization of family interaction patterns of schizophrenics' early lives as disordered does not clearly differentiate these family patterns from those of other people. Some writers have emphasized inconsistency in communication to the child who will later become schizophrenic. An example would be verbal assertions of love for the child which are incompatible with aggressive, rejecting, and hate actions toward him.

Causative factors may be mixed in with other facts known about psychoses. We know that psychoses are more prominent among lower socioeconomic groups than in higher socioeconomic groups, but the reasons for this difference are not clear at present.

PSYCHOPATHIC PERSONALITY

People who are continually at odds with society and the law but who seem to be neither neurotic nor psychotic fall into this category. Social deviance and the absence of anxiety and distress are the hallmarks of psychopathy.

Psychopaths are often charming and apparently normal, but they are oriented to use other people to satisfy their own needs and they have little or no conscience about this practice. They require quick gratification and apparently do not stop to think about legal and moral consequences of their actions, thus leading to constant trouble with the law. They are impulsive.

Psychopaths can come from all strata of society, and a major view of the cause of psychopathy is that as a child the psychopath received no love from either parent. Hence, he does not fear the loss of love, as other children do, and does not internalize parental standards or a conscience. While plausible, this theory has not been proven, and there are writers who would point to genetic factors in psychopathic personality, especially in those cases with extensive criminal records.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Manic-depressive disorders are characterized by a continual state of either excitement and elation or severe depression.

______ 2. Schizophrenia refers to a multiple personality in one individual.

______ 3. It is generally agreed that schizophrenia can be traced to one specific cause: biochemical reaction.

______ 4. Psychopaths are often charming and apparently normal, but they are oriented to use other people to satisfy their own needs and have little or no conscience about such actions.

Now turn to Answer frame 3^{16} on page 106 to check your answers.

chapter 17

MODIFICATION OF BEHAVIOR DISORDERS

FRAME 1^{17}

There was a time when mental disorder was attributed to the possession of the patient by a demon, usually evil, and in very early cultures, as well as in the Middle Ages, harsh methods were used with disturbed people. Various procedures were used, which we would now call tortures, including trials for witchcraft and subsequent burning at the stake. Later, in the Middle Ages, patients were confined to asylums, which were really prisons. The modern period of enlightenment toward mental disorders is often said to begin with *Philippe Pinel,* who improved the care of patients in an asylum in Paris of which he was put in charge in 1792. Although in this country there were various people in the 19th century who worked for improved hospitals and better conditions for their patients, the Mental Health Movement did not get fully under way until early in the 20th century. Important to this work was *Clifford Beers,* whose book, *A Mind That Found Itself,* published in 1908, recounted his own experiences (he was a manic-depressive) in mental hospitals. Beers made effective efforts to inform the public about mental illness and to improve the care of patients.

Modern treatment methods date from the late 19th century when *hypnosis* (discovered earlier) began to be used, leading to the development of *psychoanalytic treatment* by Sigmund Freud. His successors and many others have developed methods of various kinds for dealing with neurosis and the other milder forms of behavior disorders. Such methods do not seem to be widely effective or applicable to psychotic patients, and *medical methods* are in use which ameliorate the expressions of the psychosis if not the disorder itself. It is widely agreed that the disorders of psychopathic personality are very difficult to treat successfully by methods used with neurotics. Confirmed criminals, alcoholics, and sexual deviates seem to fall into this group. We can divide treatment methods into two broad classes, techniques which do involve medical procedures and those that do not. *Psychotherapy* is a general name that is applied to the latter. We shall also be interested in the effectiveness of therapeutic procedures and in programs for the prevention of behavior disorders.

MEDICAL PROCEDURES

These techniques, available only to the medically trained person, who, when he specializes in mental illness or psychiatry, is called a *psychiatrist,* are used mainly with psychotic patients. They include *psychosurgery,* a procedure which involves either removing parts of the frontal lobes (lobectomy) or severing the connections of these lobes with lower areas of the brain (lobotomy). These procedures are no longer in favor, because their effectiveness is not established and they are dangerous. *Shock therapy* is also employed. It involves inducing convulsions and unconsciousness by means of insulin injections, metrazol, or electric shock. The last is now preferred and is often carried out with patients who are in depressions. Opinions in the psychiatric profession about the use of electroshock therapy are mixed. Many feel that it is an inhumane method, with side effects and long-term effects about which more needs to be known. A recent development is *chemotherapy,* the use of drugs. Tranquilizers such as reserpine and chlorpromazine are widely used in mental hospitals and are effective in calming the patient, reducing the restraints that must be placed on him for his own safety and that of others, and making him more accessible to other treatment procedures. Tranquilizers are credited with the increase in discharge rates from mental hospitals and with the reduction in length of periods of hospitalization which have come about since their widespread introduction. They do not cure psychosis, but they have beneficial effects. Many other drugs have been tried on mental patients, some with seemingly beneficial effects, but tranquilizers are the ones mainly used currently. They may also be administered to neurotics to reduce anxiety. Extensive psychotherapy with psychotics, while occasionally helpful, is a slow and difficult process and is hardly practical for the vast majority of hospitalized patients. Yet, both limited individual and group psychotherapy, occupational therapy, and similar techniques, in combination with tranquilizers, can have value in helping the patient to recover sufficiently so that he can leave the hospital.

PSYCHOTHERAPY

Procedures that do not primarily involve medical intervention are called *psychotherapy.* We can classify psychotherapies into those used with individuals, and those used with groups. We can also divide psychotherapy into the kinds which focus on the underlying motives and conflicts and those which concentrate on the disturbed behavior itself, called *behavior modification.* Within each of these classes there are a variety of viewpoints and techniques.

Individual psychotherapy. We shall consider first the methods directed to motives and conflicts. A prime example of this procedure is *psychoanalysis,* developed by Freud and usually practiced by psychiatrists, called psychoanalysts. In its classical form, it is a time-consuming and expensive undertaking, involving several hours a week for as long as four or five years. While the initial interviews may be devoted to hearing the patient's complaints and securing information concerning his history, in the bulk of the sessions, the patient, who may lie on a couch with the analyst to his rear out of sight, is encour-

Answer frame 3^{16}

1. False. Manic-depressive disorders involve moods, but the disorder is not constant. A patient may go into a manic or depressive stage from an apparently normal period, and after a period of time the disorder will disappear.
2. False. The term schizophrenia means split mind, referring to a divorce between thought and emotion rather than to multiple personality as is sometimes thought.
3. False. Most of the work on schizophrenia has centered on three factors: hereditary, biochemical, and psychological. Despite the early promises that single causes could be traced, none of them have stood the test of careful evaluation.
4. True. Psychopaths require quick gratification and apparently do not stop to think about the legal and moral consequences of their practices.

If you missed any of the above, you should restudy Frame 3^{16} before beginning Chapter 17 on page 104.

Frame 1^{17} continued

aged to say everything and anything that comes to his mind. This technique, called *free association,* is difficult for the patient to follow, but it is considered essential, because through it connections between the patient's thoughts and feelings and ideas of which he has only limited awareness are expressed. Free association is used in *dream analysis,* in which the patient associates to dreams he has had or to fragments of them. Dreams, Freud thought, express in disguised form the motives, conflicts, and fears which underlie the patient's problems, and they can be clarified, their meaning made evident, and understood through free association. Free association, however, is not enough, and *interpretation* is made by the analyst as well. Interpretations are often directed to pointing out *resistance.* Thus, when the patient's mind goes blank and he claims to have nothing to say it may be that an interpretation is called for. One is that he is resisting, and it may be further pointed out that something in his thoughts or associations must be disturbing him and causing the resistance. Perhaps he has a dim realization of a connection between his thoughts that he does not wish to see or a feeling or an impulse that he does not wish to admit. Interpretation and analysis of resistance are a fundamental part of the uncovering procedure in psychoanalysis, leading to the patient's eventual understanding of his feelings and emotions so that he can admit and cope with them. In a sense, psychoanalysis makes the unconscious conscious, on the premise that only if one knows what goes on in his mind can he deal with it. This is exemplified in another phenomenon of the therapy, the *transference.* Strong feelings of love or of hostility toward the therapist arise in the treatment (if successful). These feelings are presumably not justified by the therapist's own actions, as he is trained to be objective, neutral and noncommittal. The transference reaction is projected onto the analyst and arises because the patient tries to put him in the parental role. It is assumed that this kind of projection is a source of the patient's problems; i.e., that he reacts to many people not as they are but as if they were like his parents. Working out the transference relation with the analyst is a way of making it possible for the patient to relate himself realistically to others rather than in terms of his distorted view of them as expressed in his transference reactions to the analyst.

In the course of the therapy, the patient comes to express his hidden emotions *(abreaction, catharsis)* and gains understanding *(insight)* into the sources of his conflicts and anxieties. He must examine the way these conflicts enter into many life situations *(working through).* It can be seen that psychoanalysis is not a quick and easy way to solve difficulties and that it is not enough, as is often believed, just to recover the memory of a traumatic event in order to be helped. Psychoanalysis is directed to a major transformation or reorganization of the personality, something not easily accomplished when the efforts to do so are entered into in adult life.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. An effective treatment for psychotic patients has been psychoanalysis.

______ 2. Psychotherapy is a form of medical treatment which has been proven very successful.

______ 3. Individual psychotherapy is exemplified by psychoanalysis, developed by Freud, and is usually practiced by psychologists.

______ 4. In a sense, psychoanalysis makes the unconscious conscious, on the premise that only if one knows what goes on in his mind can he deal with it.

Now turn to Answer frame 1^{17} on page 108 to check your answers.

FRAME 2^{17}

Individual psychotherapy *(continued).* Classical psychoanalytic psychotherapy is predicated on Freud's theories. There are other forms of analytic therapy, based on revisions of Freud's theories. Among these are therapeutic practices based on the teachings of such analysts as Adler, Jung, Horney, and Sullivan. Most of these differ from Freud in what they look for as the sources of the patient's difficulty, but they use much the same procedure and often devote much of their effort, as does Freudian analysis, to the parent-child relation. *Client-centered therapy,* sometimes called *nondirective,* places much responsibility on the patient for the topics to be discussed and for the interpretations and conclusions that are reached. It is usually oriented to present concerns and emphasizes the patient's feelings about them. The therapist is nondirective in that he does not suggest things to be discussed or make interpretations. Rather, he accepts what the patient says and may clarify the feelings the patient expresses uncertainly and hesitantly. He respects the client and attempts to see things as the patient sees them. In doing so, he helps the client understand his problems and see how they disturb his functioning. Then the client, feeling accepted by the therapist, and understanding his reactions, may be able to improve.

Psychoanalysis and client-centered therapy seem to work best on neurotic and mild problems and with people who are articulate and are motivated to change. If the patient sees no reason to change, these techniques are not likely to be of help. Another form of therapy, *existential therapy,* is much like client-centered therapy in procedure, although it incorporates existentialist assumptions. Thus, it is primarily oriented to find a satisfactory way of life, despite the threat of death and the arbitrariness and meaninglessness of existence.

Behavior modification. Application of the principles of learning, outlined in an earlier chapter, is called *behavior modification.* In this form of treatment, the orientation is to deal with the disturbed behavior itself, rather than its underlying sources. Practitioners of this persuasion do not think it is necessary to treat underlying conflicts and motives, arguing that it is effective to treat the behavior itself. They claim that elimination of one set of symptoms does not lead to the appearance of other symptoms (symptom substitution) as some of their opponents fear and can cite evidence to support their claim.

A general technique which is used is *counterconditioning,* setting up responses antagonistic to those which are the symptoms. One procedure is to train the subject in muscular relaxation. He is also asked to provide a list of situations which arouse anxiety and to grade the items of the list for the degree of anxiety they arouse. Then he is asked to imagine the situations he has listed, starting with the least anxiety-arousing one, or to encounter a situation which arouses anxiety in small amounts, while he is relaxed. After he is able to experience the mild anxiety-arousing images without difficulty, he moves up the hierarchy in his list, one by one, imagining each item in a relaxed state. This process is known as *desensitization,* and it counterposes relaxation against the anxiety or other responses which have constituted a problem for a patient. Sometimes, a

Answer frame 1^{17}

1. False. Psychoanalytic treatments by Freud and his successors have been rather successful with neurosis and other milder forms of behavior disorders but not with psychosis.
2. False. Psychotherapy is not a form of medical treatment. Medical procedures do include psychosurgery (not in favor today because of the danger), shock therapy, and chemotherapy.
3. False. Psychoanalysis is usually practiced by psychiatrists called psychoanalysts.
4. True. Interpretation and analysis of resistance are a fundamental part of the uncovering procedure in psychoanalysis, leading to the patient's eventual understanding of his feelings and emotions so that he can admit and cope with them.

If you missed any of the above, you should reread Frame 1^{17} before turning to Frame 2^{17} on page 107.

Frame 2^{17} continued

modeling procedure is used, as in the treatment of snake phobias, for example. In this case, a live model or filmed models (symbolic modeling) will be shown interacting with a large but harmless snake. Desensitization is often combined with the use of models. The results show that the snake phobia is most effectively overcome when the phobic person imitates a live model. Symbolic modeling and desensitization are next most effective.

Other forms of behavior modification involve the use of reinforcement (and sometimes punishment). For example, one may reward a shy child for speaking or for taking part in activities, again beginning by rewarding partial or incomplete responses that are in the desired direction. Or one can withhold reinforcement (negative reinforcement) while the child does undesirable things, making positive reinforcement contingent on the occurrence of the desired behavior rather than that which is undesired.

These techniques work best when the therapist has control over the events in the environment and over the ways in which a patient can obtain the things he desires. Wards in hospitals offer such control, and "*token economies*" have been set up in a number of them. The patient receives tokens for the things he does–like making his bed, cleaning up the ward, dressing neatly, eating properly, participating in social activities with others–and he can cash in the tokens for desired commodities (candy bars, soft drinks, cigarettes) at a later time; he cannot obtain them in other ways. Marked improvement in the appearance and behavior of patients and in the climate of the ward is often reported when these procedures are used.

Aversive procedures have had some use in behavior modification, especially in cases such as alcoholism where the undesired activity is strongly rewarding to the patient. Here the patient may be given a drug which, when he imbibes alcohol, makes him sick. The association between the alcohol and the sickness presumably makes alcohol aversive.

Behavior modification is a *directive therapy*, in that the therapist plays a very active role in setting up and carrying out the procedures. Another directive therapy uses hypnosis, called *hypotherapy*, one technique of which is to suggest to the patient, while he is hypnotized, that later he will or will not do the things about which his problems center. There is also *situational* therapy, in which aspects of the situation of the patient are altered or corrected. The purpose is to get the patient away from the circumstances in which his problems have appeared. This procedure is not widely supported except in the case of children. With them, the effort is made to modify the family situation by treating, usually in group therapy, the entire family, thus altering the environment in which the child lives. Play therapy, a technique used with children, in which the verbal character of much individual treatment is replaced by play, is often also carried out with the child along with the family therapy.

GROUP THERAPY

Individual therapy is very time consuming and expensive, and treatment of a group of people with a therapist is much more economical. Much of the therapy occurs through the discussion by group members of their problems and their reactions to and comments about the problems of others. Group therapy often follows the medical procedures used in hospitals and may be used to treat neurosis. One form of group therapy is *psychodrama,* in which patients enact or see enacted roles as they perceive them of the people in their lives. Sometimes this is called *role therapy.* Somewhat similar procedures are used in sessions with normal people to help them express themselves and overcome feelings of loneliness and alienation. These techniques are variously called *T-groups, sensitivity training,* and *encounter groups.* Many people report substantial benefits from participation in such groups.

EFFECTIVENESS OF THERAPY

This is a complex issue. One problem arises from the uncertainty as to what constitutes a cure or improvement. Criteria for cures and improvement are not clear cut or well agreed on, and the patient may feel that he is better whereas other people may not agree. Whose word should receive the most weight? The base rates for recovery or improvement without therapy are usually not well known, and there is some evidence in the literature which is used to claim that the results from psychotherapy are no better than the rate of spontaneous recovery or improvement. Needless to say, this claim is hotly disputed by many therapists.

There are cases reported to have made dramatic improvement during therapy whereas others are known that have not improved. No one advocates the giving up of therapy, but many workers are dissatisfied with present results. One reason is that psychotherapy does not seem to be feasible for or applicable to many people who need help.

COMMUNITY MENTAL HEALTH AND PREVENTION OF MENTAL ILLNESS

A movement has developed to bring mental health services to the community, rather than to confine them to a distant mental hospital or clinic, and to involve community groups and organizations in coping with mental health problems. Early and emergency treatment of problems is one goal of such efforts, and attention is also focused on aspects of community life, such as housing, segregation, poverty, and the like, which are conducive of mental disturbance. There is an attempt to detect problems of children in the schools, in the belief that, corrected there, they will not develop into the more serious disturbances of later life. Educational efforts are made to promote the kinds of familial and other relationships thought to be desirable for good mental health.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Client-centered therapy places much responsibility on the patient for the topics to be discussed *and* for the interpretations and conclusions that are reached.

______ 2. In the form of treatment known as behavior modification, the orientation is to deal with the disturbed behavior itself rather than its underlying sources.

______ 3. Group therapy may be used to treat neurosis and it may also be used in sessions with normal people.

______ 4. Various forms of therapy are available to practitioners so that all patients may be cured or improved significantly.

Now turn to Answer frame 2^{17} on page 110 to check your answers.

Answer frame 2^{17}

1. True. Client-centered therapy seems to work best on neurotic and mild problems and with people who are articulate and are motivated to change.
2. True. A general technique which is used is *counter-conditioning,* setting up responses antagonistic to those which are the symptoms. One process, *desensitization,* counterposes relaxation against the anxiety or other responses which have been a problem for the patient.
3. True. One form of group therapy is psychodrama in which patients enact or see enacted roles as they perceive them of the people in their lives. Similar techniques are used for normal people to help them express themselves and overcome feelings of loneliness and alienation.
4. False. There are cases reported to have made dramatic improvement during therapy, whereas others are known that have not improved. Psychotherapy does not seem feasible for or applicable to many people who need help.

If you missed any of the above, you should reread Frame 2^{17} before beginning Chapter 18 below.

chapter 18

SOCIAL PSYCHOLOGY

FRAME 1^{18}

Although social interactions have been mentioned in some of the earlier chapters, we have not, in the main, indicated the extent to which man, a highly social animal, is involved in and influenced by his relations with other people. These matters are the subject of social psychology, and we survey in this chapter some of the major topics studied in this large and complex area.

PERSON PERCEPTION AND INTERPERSONAL ATTRACTION

In interacting with people, we perceive or have impressions about them. Our initial impressions, at least in experimental situations, are often influenced by a particular trait. For example, in one study people were asked to characterize a person after hearing a list of adjectives presumably describing him. There were two lists, identical save that one included the adjective "warm," whereas the other included "cold." Rather different descriptions emerged for the two lists of adjectives, the traits warm and cold influencing the interpretation of the other (common) items in the list. One can be set to perceive a person in a given way by the kind of introduction he is given, whether it mentions personality traits (like warm or cold) or whether it mentions his social role, like professor or factory worker, or his nationality. First impressions may endure, especially when further interaction with the person is limited.

A number of factors seem to affect interpersonal attraction. One is *nearness;* i.e., we tend to see people who live or work near us, and they become our friends and acquaintances (on the average) and even our spouses. We are attracted to people who like us, people whom we see frequently, and people with whom we are committed to work. We like people whose attitudes and opinions are similar to our own. *Physical attractiveness* also plays a part in our attraction to others. All of these points have been supported by investigation, but, of course, in complex everyday life situations there will be exceptions to each one. Interpersonal attraction is a complex matter involving many interacting factors.

GROUP AND INDIVIDUAL BEHAVIOR

Early interest in groups lay in the question whether a person works better in the presence of others or alone. People were asked to solve problems either alone or in a room with other people who were also working on the tasks. The group situation increased the speed of performance, but accuracy was not consistently affected. But in these experiments, there was no real *group,* since the people did not interact with one another.

We belong to many groups which influence our behavior. For example, we belong to a culture, a social class within that culture, churches, fraternal organizations, unions, and we have occupational roles, family roles, and many others. We may also belong to smaller groups, organized for one or another purpose and enduring for some length of time. The *small group* has been a favorite object of study in social psychology. What are some of its characteristics and effects?

Groups vary in a number of properties. Among them are size, their degree of organization and formality of operation, the extent to which they are hierarchically organized, the control they exert over their members, how much participation the members can and do contribute, ease of joining them and of withdrawal and expulsion, stability of the group and continuity of membership, the degree of intermember intimacy, and the degree of clique formation.

Variables manipulated in the study of groups include their composition, communication patterns, and cohesiveness. Groups comprised of four individuals each, homogeneous or heterogeneous with respect to scores on a personality scale, were found to differ in the quality of solutions they produced to a problem, the heterogeneous group producing solutions of better quality. The members of the homogeneous groups were better satisfied with the solutions than the other groups. However, the first conclusion does not always hold, especially for simple or routine tasks in which homogeneous pairs do better than heterogeneous pairs.

Groups often do not allow free discussion, usually employing a leader or chairman who regulates opportunities to speak. In studies of communication patterns, contrived experimentally for the purpose, people like free communication better than other patterns, but in one study problem solution was quickest in the group in which one member received communications from and sent them to all the group members, who did not communicate with one another. However, the most effective communication pattern varies with the difficulty of the task, and patterns involving intercommunication among all the members may be more conducive to the solution of complex problems than the one which is organized around one central individual.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

______ 1. Our first impressions about people are often influenced by a particular trait and may endure for a long time, especially when further interaction with the person is limited.

______ 2. One accepted concept of interpersonal attraction is that opposites attract.

______ 3. Groups that are homogeneous on a personality scale always produce solutions of better quality than heterogeneous personality groups.

______ 4. The most effective communication pattern in groups is to have a leader monitor the conversation.

Now turn to Answer frame 1^{18} on page 114 to check your responses.

FRAME 2^{18}

GROUP AND INDIVIDUAL BEHAVIOR *(continued)*

The *cohesiveness* of a group is the degree of its attractiveness for all its members and such cohesiveness is augmented in the presence of a common fate, external threats, competition with other groups, and the clarity of group goals. Cohesive groups will be more productive than noncohesive groups, if the group's goal is productivity, but not otherwise.

Social life, including that in groups, involves *accommodation to others.* For example, there are patterns or norms of conduct which develop in groups, and there may be considerable pressure on a group member to adjust his conduct to fit the group norm. One study explored judgments of movement of a point of light in an otherwise dark room *(autokinetic phenomenon).* First, the subject's judgments were obtained alone, then with two other subjects, and the judgments were announced aloud. A major finding was that the originally discrepant judgments became similar, at a value intermediate to the original ones. The status of another subject is also important to the extent to which a subject's judgments change to conform to the other's judgments. Another study employed judgments of line length in a situation in which all the members of the group but one were stooges of the experimenter. The subjects were told to match one of three lines in length with that of a standard line. One of the three lines was actually a close match of the standard, but the others obviously differed from it. The subject was the next to last to announce his judgment. After a few preliminary judgments in which everyone picked the line objectively near the standard in length, the stooges began to choose lines obviously shorter than the standard. This put the true subject in a conflict between the evidence of his senses and the judgments he heard. Many subjects *vacillated*, sometimes going along with the group, sometimes not. Others *capitulated* entirely and some never did. The subjects who tend to conform in this situation include firstborn and only children (see Chapter 10), and those who are low in ability, self-confidence, self-reliance, and originality but who are high in authoritarianism.

There is an even more dramatic example of compliance in the literature, arising in the social situation of an experimenter and two subjects. People were recruited from the community for a learning experiment. The learner, however, was a stooge of the experimenter, and the subject was to teach him paired-associates by administering electric shock for errors. (The learner was not actually shocked but from another room he could be heard pounding on the wall when the shocks became severe.) The interesting finding of the experiment is that all subjects were willing to give the stooge shocks of up to 300 volts and half accorded with the experimenter's requests up to the maximum of 450 volts, despite every evidence that the stooge was in extreme pain and despite their own reluctance to do so. *Social pressure*, then, applied by a status figure or by peers in a group, can have marked effects on one's judgment and behavior if he is a compliant person. The phenomenon of brainwashing may be somewhat similar, although in this case, during the Korean War, there was also physical debility, dependency on captors for food and other necessities, and dread of possible torture. There was also incessant propaganda.

Decisions that are made by groups commit the members to a greater extent than is the case when decisions are simply told to a group. The decisions of a group may also be riskier than those of individuals. Group problem solving ("brainstorming") is not necessarily more effective than individual problem solving.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. Cohesive groups are always more productive than noncohesive groups.

_______ 2. Many people conform to group norms even when the evidence of their senses tells them the group is wrong.

_______ 3. Most people will not conform to group pressure when the action called for causes physical pain to some other individual.

_______ 4. Decisions that are made by groups commit the members to a greater extent than is the case when decisions are simply told to a group.

Now turn to Answer frame 2^{18} on page 114 to check your answers.

FRAME 3^{18}

LEADERSHIP

Groups typically have leaders, appointed, natural, or elected, and there is a strong belief that the effectiveness of groups is related to the qualities of their leadership. One question that has received extensive study is whether people who are leaders have special traits. Although some differences between leaders and followers are reported, the differences are small. Furthermore, there is evidence that the person who leads in one situation may not be the leader in another situation.

Many groups have *two leadership roles,* and the same person does not occupy both. One role gives directives and provides ideas to the group; the other resolves tension and maintains the unity of the group. When two people take these roles, as they often do when leadership emerges in an unstructured group, the latter person is better liked than the former.

In an unstructured group, status differences emerge first for the leader and the lowest status person or persons. The status roles of the others develop later. A great deal of effort has been devoted to finding the traits of leaders. While there is evidence that leaders do differ from followers by being more intelligent, more dominant, better adjusted, and the like, they do not differ by much. The task may make a difference as to who is the leader. For example, one person may take the lead in intellectual kinds of problems and situations, whereas another individual will lead when the task is manipulative or mechanical. Special knowledge or skill will, of course, help to confer leadership on the person who has the skill.

Leadership styles vary, and some effort has been made to study the effectiveness of different styles. In one study, boys' clubs were organized and were led in different ways by adult leaders trained to assume each of three styles. One was *autocratic;* the leader made the decisions as to what would be done and how, directing the boys what to do. In the *democratic* "climate," the boys decided these matters through discussion guided by the leader; the *laissez-faire* leader did nothing except to supply information when he was asked for it.

Substantial differences in group behavior attended these differences in leadership styles. There was either hostility or apathy in the autocratically led groups, with a good deal of "picking on" one member of the group *(scapegoating).* The democratically led group manifested less aggression and showed pride in their products, whereas the autocratically led boys often destroyed their products after the meeting. The laissez-faire group was in between. The differences

Answer frame 1^{18}

1. True. One can be set to perceive a person in a given way by the kind of introduction he is given, whether it mentions personality traits (like warm or cold) or whether it mentions his social role.
2. False. Normally, we like people whose attitudes and opinions are similar to our own. However, interpersonal attraction is a complex matter involving many interacting factors.
3. False. Heterogeneous groups produced solutions of better quality on relatively complex problems, but on simple or routine tasks homogeneous pairs did better.
4. False. The most effective communication pattern varies with the difficulty of the task, and patterns involving intercommunication among all the members may be more conducive to the solution of complex problems than one which is organized around a leader.

If you missed any of the above, you should restudy Frame 1^{18} before turning to Frame 2^{18} on page 112.

Frame 2^{18} continued

Answer frame 2^{18}

1. False. Cohesive groups will be more productive if the group's goal is productivity but not otherwise.
2. True. Subjects who tend to conform in test situations include firstborn and only children and those low in ability, self-confidence, self-reliance, and originality but who are high in authoritarianism.
3. False. All subjects in one experiment were willing to give another person shocks of up to 300 volts despite evidence that this caused the other person severe pain.
4. True. This concept is the basis for participative management where employees are included in decision making to increase their commitment to the decision.

If you missed any of the above, you should review Frame 2^{18} before turning to Frame 3^{18} on page 113.

Frame 3^{18} continued

here are primarily related to morale, and it is often the case that productivity is as great or greater under authoritarian leadership as it is under democratic leadership.

ATTITUDES

This term designates a central construct in social psychology. Favorable or unfavorable responses to objects or situations are said to be mediated by attitudes, which are *learned dispositions toward objects, including people, and situations.* Attitudes are closely related to *opinions.* If one says that the United States should withdraw from Vietnam, an opinion, he may be expressing an attitude toward war. *Prejudices* are attitudes unjustified by experience, as are *stereotypes,* which are simplified beliefs, such as that all redheads are quick-tempered.

There are many reasons for measuring attitudes, and scaling procedures have been used to develop attitude scales. Many such scales have been constructed and are used in research. A kind of attitude measurement, or more properly, opinion measurement, is exemplified by the *public opinion poll.* In such procedures, interviewers ask questions of a sample of interviewees. Many of the questions are answerable by either yes or no. We are all familiar with polling, because of its prominence, especially around election time, in newspapers and magazines. And we know that polls are reasonably accurate, although from time to time they have predicted that the actual loser in the election will win.

Polling is a complex matter on at least two counts. One is the wording of the question: It is possible to alter responses to questions in significant amounts by seemingly minor variations in the wording of questions. Pollers attempt to control for this factor by *pretesting* their questions and by asking more than one question concerning a given issue. The second is the problem of *sampling* from the population.

Polls can be wrong if their samples of people do not adequately represent those who will vote. One cannot, for example, usually predict the outcome of an election accurately by asking his friends how they intend to vote. One's friends are not representative of the voting population at large. Polls are conducted with very carefully selected samples of people. The samples are selected to be representative of voters, so a sample will have prescribed proportions of men and women, old and young, black and white, rural and urban residents, people from the various socioeconomic levels, and the like. From knowledge of the characteristics of areas of cities and other geographic entities, the poller will assign his interviewers to obtain interviews with people in certain blocks of a city or even in certain houses. Even with careful sampling and careful wording of questions, errors can be made. One arises from the fact that some people will change their decisions between the time of the poll and that of the election. Another is voter turnout; bad weather, for example, can lead to a reduction in the voting population from the total estimated on the basis of the number of interviewees who said they intended to vote.

The general success of opinion polls in predicting election outcomes suggests a strong relation between measured opinions or attitudes and behavior. The relation is not always so close, however. Oftentimes, situational factors may interfere with the expression of behavior consistent with a verbally expressed attitude. Attitudes, of course, vary in the degree to which they are held, and inconsistency between attitude and behavior is likely to arise in the case of weakly held attitudes.

ATTITUDE CHANGE

Attitudes can be changed, and it is convenient to discuss this topic around three factors in the process. The first is the characteristics of the *source of the message* which seeks to change the attitude. We are likely to be influenced by the message if the source is a *prestige figure* or one with *authority* in the subject matter of the attitude and if the source has a previous record of *credibility*. With time, however, the influence of the source may not be as important to attitude change as it is immediately following the message. The attractiveness of the source and our liking for him are also factors in attitude change. Similarity between the persuader and the person to whom he directs his argument is also a factor; we are more influenced by those who are similar to us in various ways than by someone who is dissimilar.

The second aspect of attitude change is, of course, the *message* itself. Many messages, as in political argument and in advertising, rely on endorsements by well-known, admired, and prestigious people. Shifts in an unfavorable direction toward an issue, of course, can be accomplished by associating the object of the attitude with an unpopular label, such as "communist." Fear is often used in messages, as when the ill-consequences to health are pointed out in the case of cigarette smoking, drunken driving, or other drug use. High levels of fear, however, are not as effective in getting people to obey the message as are intermediate levels. Evidently, strong fear induces an avoidance of the whole situation in many cases. Messages can be one-sided or can present both sides of a question. The latter seems to be more effective in changing attitudes than the former, whereas the one-sided approach seems to strengthen attitudes that already exist.

The *recipient of the message* is the third factor. Some people are influenceable, and their attitudes are readily changed. If the change in attitude can be associated in some way with the individual's needs or goals, he may be affected by the communication. On the other hand, one can be immunized to an attempt at attitude change by becoming familiar with some of the arguments for the change ahead of time. Apparently, this familiarization allows the subject to build defenses against the arguments so that they do not influence him.

Much effort has been devoted to studies of ways to overcome prejudice. One of the most striking results is the change that often accompanies contact with the objects of the prejudice. Thus white soldiers in integrated units and white people living in integrated housing projects have been reported to change their attitudes in a direction much more favorable to blacks than was the case before the integrated experience. However, sheer contact between blacks and whites is not enough to ensure changes in prejudice. Also necessary are the presence of constraints on the majority to keep them in the situation with the minority group; equal status for the members of both groups; that they share goals; and that their contacts are pleasant. It is the absence of these factors that may make contact ineffectual in reducing prejudice.

Indicate whether each of the following statements is true or false by writing "T" or "F" in the space provided.

_______ 1. Leaders have special traits that differentiate them from followers and this leadership ability is applicable in any situation.

_______ 2. Productivity is always the greatest when the leadership is democratic.

_______ 3. Attitudes are *learned* dispositions toward objects, including people and situations.

_______ 4. Attitudes can be changed, but many factors must be considered in attempting attitude change.

Now turn to Answer frame 3^{18} on page 118 to check your answers.

FRAME 4^{18}

This concludes Chapter 18 and the Introductory Psychology PLAID. You should now work Examination three on page 126. The Glossary-Index on page 131 provides definitions of concepts and terms for psychology.

Though you have completed the entire PLAID, there may be many times when various segments will again be helpful. You are encouraged to keep it handy for future use and reference.

Answer frame 3^{18}

1. False. Although some differences between leaders and followers have been reported, the differences are small. There is much evidence to show that the person who leads in one situation may not be the leader in another situation.
2. False. It is often the case that productivity is as great or greater under authoritarian leadership as it is under democratic leadership.
3. True. Attitudes are closely related to opinions. An opinion is an expressed attitude. Expressed opinions may differ from attitudes if the person is trying to hide his true attitude toward the subject.
4. True. The first factor is the source of the message. We are more apt to change if the source is an authority and is believable. The message itself is another factor. The recipient of the message is another factor. These factors make opinion change a complex and difficult matter.

If you missed any of the above, you should review Frame 3^{18} before turning to Frame 4^{18} on page 116.

Examination one: Chapters 1-6

When there are choices designated by (a), (b), and so on, write the letter of the choice in the space to the left of the item. When, as in numbers (2) and (3) below, there are no choices write the appropriate word or phrase in the blank to the left of the item.

___ 1. Psychology is defined as the science of (a) mind, (b) behavior, (c) soul.

___ 2. The view that there are innate ideas.

___ 3. The view that our ideas come from experience.

___ 4. The most direct influence on the founding of psychology was (a) physiology, (b) evolution, (c) philosophy, (d) theology.

___ 5. Behaviorism developed out of the (a) structuralist, (b) Gestalt, (c) psychoanalytic, (d) functionalist school.

___ 6. Survey methods would typically be used in (a) experimental work, (b) clinical assessment, (c) opinion polls, (d) psychotherapy.

___ 7. The kind of psychologist who works in the diagnosis and treatment of people with severe emotional disturbances.

___ 8. An experimental psychologist would study (a) personnel selection, (b) attitudes and beliefs, (c) the theory of tests, (d) principles of learning, motivation, and perception.

___ 9. The two major integrative systems of the body. (Write one in the blank to the left of number 9 and the other in the blank to the left of number 10.)

___ 10.

___ 11. A transmitter substance is a chemical which causes (a) nerve impulses in axons, (b) nerve impulses in cell bodies, (c) conduction of nerve impulses across synapses, (d) muscles to contract and relax in reciprocal innervation.

___ 12. A nerve is (a) a neuron, (b) a bundle of nerve fibers, (c) a synaptic connection, (d) an axon.

___ 13. The autonomic nervous system activates (a) skeletal muscles, (b) smooth muscles, (c) striated muscles, (d) muscles which move bones in their joints.

___ 14. The autonomic nervous system is integrated with the central nervous system through (a) ganglia external to the central nervous system, (b) the peripheral nervous system, (c) direct connections to the brain, (d) the system of endocrine glands.

___ 15. The excitement of emotion arises to a large extent from the actions of (a) the parasympathetic nervous system, (b) the peripheral nervous system, (c) the endocrine glands, (d) the sympathetic nervous system.

___ 16. The cerebrum of the brain contains, among other things, (a) the pons, (b) the cerebellum, (c) the medulla oblongata, (d) the thalamus.

___ 17. Sensory experiences from the body appear to involve (a) the motor area of the frontal lobe of the cortex, (b) the association areas of the frontal lobe, (c) the parietal lobe, (d) the temporal lobe.

___ 18. Thought and memory seem to involve primarily (a) association areas, (b) speech areas, (c) visual areas, (d) auditory areas of the cerebral cortex.

___ 19. Hormones are secreted (a) by salivary glands, (b) by endocrine glands, (c) by sweat glands, (d) by the reticular formation.

___ 20. Identical heredities in two individuals are (a) never found, (b) found in identical twins, (c) found in fraternal twins, (d) occasionally found in nontwin siblings.

___ 21. A recessive gene (a) is present in the genotype, (b) is not always apparent in the phenotype, (c) cancels out the effects of a dominant gene, (d) is found only for eye color.

___ 22. Congenital influences on characteristics arise from (a) recessive genes, (b) a dominant-recessive gene combination, (c) influences on the fetus, (d) experiences after birth.

___ 23. The cephalo-caudal pattern of development means that development advances more rapidly in (a) the head end, (b) the tail end, (c) the lip, (d) the arms than anywhere else.

___ 24. Species-specific patterns in the human being are illustrated by (a) reading and walking, (b) babbling and reading, (c) no instances at all, (d) walking and talking.

___ 25. Training of young children on a performance like climbing (a) destroys the ordinary maturational sequence, (b) has no effect as compared with normal development, (c) produces personality disturbances, (d) is unlikely to upset the normal developmental sequence.

___ 26. When rats are mated with other rats which have similar maze learning scores, the result in offspring over several generations is (a) there are no differences, (b) that one obtains maze-bright and maze-dull rats, (c) that one gets a strain of neurotic and normal rats, (d) one gets rats with high-general and low-general intelligence.

___ 27. Intelligence scores are most similar for one of the following combinations: (a) fraternal twins, (b) foster children and their foster parents, (c) identical twins, (d) foster children and their biological parents.

___ 28. Many investigators think that language is characterized by (a) a critical period, (b) a stage of development, (c) reversals of sequences, (d) exceptionally rapid growth after adolescence.

___ 29. A stage of development is defined (a) as a critical period, (b) a period of development in which behavior is relatively distinct, (c) an outmoded concept, (d) a result of common experience most children have.

___ 30. At 10 days of age, infants (a) show no interest in visual patterns, (b) prefer simple to complex visual patterns, (c) prefer moderately complex to simple visual patterns, (d) manifest interest only in the most complex visual patterns.

___ 31. In the preoperational stage development includes (a) hierarchical classification, (b) conservation, (c) abstract thought, (d) hypotheses testing.

___ 32. Failure of conservation of volume is illustrated by belief that (a) the amount of water is changed when the water is poured from a vessel of one shape into one of another shape, (b) when a ball of clay changes from one shape to another as the amount of clay changes, (c) there is no change in quantity of these substances when shapes are changed, (d) the child plays in water, thus wasting it.

___ 33. The first emotional response in children is (a) disgust, (b) joy, (c) excitement, (d) distress.

___ 34. From studies of infants we should expect that one of the following emotions would appear after each of the others: (a) disgust, (b) excitement, (c) affection, (d) fear.

___ 35. The order of the psychosexual stages of development, according to Freud, are (a) anal, oral, phallic, and genital, (b) oral, anal, phallic, and genital, (c) oral, phallic, anal, and genital, (d) genital, phallic, anal, and oral.

___ 36. Personality disorders and mental illness were attributed by Freud to (a) fixation at a sexual stage of development, (b) events in the latency stage, (c) events in the anal stage, (d) successful resolution of the oedipus complex.

___ 37. The imprinting which appears in such birds as geese occurs to (a) the animal that feeds them, (b) the parents and siblings, (c) the first moving object experienced after birth, (d) the first moving object experienced after separation from the mother.

___ 38. Learning, as a relatively permanent modification in behavior, is caused by (a) motivation, (b) changes in receptor sensitivity, (c) maturation, (d) practice.

___ 39. In Bekhterev's procedure, the unconditioned stimulus was (a) food, (b) a tone, (c) electric shock, (d) weak hydrochloric acid.

___ 40. The most effective time interval between the onset of CS and that of US for classical conditioning is (a) zero, (b) one-half second, (c) a very long one, (d) one in which US precedes CS.

___ 41. When, over a number of trials, the US is not presented, the conditioned response (a) is reconditioned, (b) generalizes, (c) recovers spontaneously, (d) extinguishes.

___ 42. In the case in which the animal's response produces the reinforcement, we have (a) operant conditioning, (b) classical conditioning, (c) Pavlovian conditioning, (d) classical aversive conditioning.

___ 43. Partial or intermittent reinforcement (a) accelerates conditioning, (b) retards extinction, (c) accelerates extinction, (d) produces generalization.

___ 44. Very high response rates are developed by (a) continuous reinforcement, (b) interval schedules, (c) ratio schedules, (d) spontaneous recovery.

___ 45. The shaping procedure resembles (a) classical conditioning, (b) secondary reinforcement, (c) classical aversive conditioning, (d) trial and error in maze and puzzle box learning.

___ 46. Perceptual learning is exemplified by (a) learning in an open maze, (b) classical conditioning, (c) operant conditioning, (d) avoidance learning.

___ 47. Ebbinghaus learned (a) stories by the serial learning method, (b) nonsense syllables by the paired-associate method, (c) nonsense syllables in the serial learning method, (d) nonsense syllables by the free recall method.

___ 48. Ebbinghaus measured retention by means of (a) the savings method, (b) the recall method, (c) the recognition method, (d) the free recall method.

___ 49. When subjects are told to recall a list in any order of the items, the method being used is (a) serial recall, (b) free recall, (c) recognition, (d) savings.

___ 50. A major factor determining retention is (a) decay of the trace, (b) the meaningfulness of the material, (c) whether learning was fast or slow, (d) the degree to which the material was learned.

___ 51. The following factor would make for the fastest learning of a set of words: (a) massing of practice, (b) concreteness of the words, (c) brief presentation of items, (d) abstractness of the words.

___ 52. To prevent or retard forgetting, one would (a) mass practice, (b) devote about 5 percent of his time to rehearsal, (c) learn the material to bare mastery, (d) overlearn the material.

___ 53. Decay theories of forgetting emphasize (a) interference between activities, (b) preservation of childhood memories, (c) alteration of the trace of metabolic events, (d) superior retention following an interval filled with sleep.

___ 54. Interference theories of forgetting emphasize (a) interference between activities, (b) decay of the trace, (c) retrieval cues, (d) permanent loss of items from memory.

___ 55. Much of the forgetting Ebbinghaus exhibited is now attributed to (a) retroactive inhibition (b) decay, (c) proactive inhibition, (d) the criterion of mastery he used.

___ 56. The short-term memory store (a) has a limited capacity, (b) never shows loss, (c) has unlimited capacity, (d) persists for a second or less.

___ 57. Learning to learn is an example of (a) forgetting, (b) retrieval, (c) serial learning, (d) transfer of training.

___ 58. Positive transfer in the case of motor skills is greatest (a) from the foot to the hand on the same side, (b) from one hand to the other and from one foot to the other, (c) from the hand to the foot on the other side, (d) from the foot to the hand on the other side.

Examination two: Chapters 7-12

__ 1. Imageless thought found favor (a) with the British associationists, (b) with the behaviorists, (c) with the Würzburg psychologists, (d) with no one.

__ 2. The word concept designates (a) highly abstract properties, (b) concrete properties, (c) items which vary in degree of abstractness, (d) particular objects.

__ 3. A conjunctive concept is defined by (a) two or more properties in an either-or fashion, (b) two or more properties all of which must be present, (c) a single property, (d) the absence of a property.

__ 4. The semantic differential is used to study (a) imageless thought, (b) classification of concepts, (c) the number of word associations a person will give for a concept, (d) the meaning of concepts in terms of dimensions of evaluation, potency, and activity.

__ 5. Tool-using in chimpanzees has been taken as evidence for (a) insight, (b) trial and error, (c) imageless thought, (d) the use of images.

__ 6. Problem solving can be impeded by (a) fixed functions of objects, (b) habitual solutions, (c) biases, (d) all of these.

__ 7. Incubation is (a) a stage of creative thinking, (b) a period of trial and error, (c) a period of many insights, (d) a period of conscious reasoning.

__ 8. Tiny movements of the muscles (a) must be present for thinking to occur, (b) often accompany thinking, (c) never accompany thinking, (d) occur only in deaf people during thinking.

__ 9. When we use psychophysical methods, we are typically measuring (a) sensory thresholds, (b) physiological reactions, (c) images, (d) imageless thought.

__ 10. An example of an absolute threshold would be (a) the just detectable difference between two tones, (b) the just detectable value of a stimulus, (c) the presence of sensory spots on the skin, (d) the meaning of a stimulus.

__ 11. The weakening of the subjective intensity of sunlight some time after we have left a dark movie theater illustrates (a) the power law, (b) Weber's law, (c) sensory adaptation, (d) receptor constancy.

__ 12. White light is an electromagnetic stimulus (a) at 400 nanometers, (b) at 700 nanometers, (c) of great saturation, (d) which is a mixture of all visible energies.

__ 13. Hue or color depends mainly on (a) mixture of complementary colors, (b) number of frequencies present simultaneously, (c) wavelength in nanometers, (d) the intensity of the stimulus.

__ 14. All colors of the spectrum can be produced by mixing one of the following combinations of lights: (a) red, green, blue, (b) red, green, yellow, (c) red and yellow, (d) blue and red.

__ 15. A decibel indicates (a) the pitch of a sound, (b) the timbre of a musical instrument, (c) sound intensity, (d) how much noise there is in a sound.

__ 16. The sensitive cells for hearing are located (a) in the auditory canal, (b) on the basilar membrane, (c) on the sound window, (d) on the oval window.

__ 17. Hearing may best be explained by (a) the place theory, (b) the telephone theory, (c) the volley theory, (d) a combination of place, telephone and volley theories.

__ 18. The skin senses include (a) touch and pain, (b) touch, pain, cold, and warmth,

(c) warmth and heat, (d) touch, pain, and cold.

___ 19. To use the part of the tongue that is most sensitive to sweet tasting substances, you would use (a) its tip, (b) its back, (c) its sides, (d) as much of it as you can.

___ 20. The knowledge we have concerning movements of the body and its parts comes from (a) sight, (b) the vestibular system, (c) the semicircular canals, (d) the kinesthetic sense.

___ 21. Mach bands (a) show that contour depends precisely on physical stimulation, (b) are lines seen in a figure in which there is a change of light intensity from one end to the other, (c) are seen where a black outline meets the surrounding white background, (d) are found in all perceptions of contour.

___ 22. Perception refers to (a) sensing the environment, (b) taking in the physical energies of stimuli, (c) seeing the environment in an organized way, (d) the appearance of contour in an homogeneous field.

___ 23. The principles of perceptual organization are found (a) in vision, touch, and hearing, (b) only in vision, (c) in vision and touch, only, (d) in vision and hearing, only.

___ 24. Illustrations of the effect of context upon perception are afforded by (a) geometrical illusions, (b) adaptation level, (c) figural aftereffects, (d) all of these.

___ 25. The appearance of a stable world of shapes, sizes, colors, and brightnesses is an effect known as (a) illusion, (b) figural aftereffects, (c) figure-ground, (d) constancy.

___ 26. A monocular cue for depth perception is (a) gradient of texture, (b) retinal disparity, (c) convergence, (d) none of these.

___ 27. The phi phenomenon is (a) a geometric illusion, (b) a name for the figure-ground effect, (c) apparent movement, (d) autokinetic movement.

___ 28. Drive replaced one of the following concepts: (a) instinct, (b) incentive, (c) unconscious motive, (d) motive.

___ 29. A balance in bodily processes is called (a) drive, (b) motive, (c) discomfort, (d) homeostasis.

___ 30. Hunger phenomena seem to be mediated by (a) stomach contractions, (b) two areas in the hypothalamus, (c) one area in the hypothalamus, (d) a dry mouth and throat.

___ 31. With regard to hunger, external stimuli (a) play no role, (b) interact with deprivation of food, (c) are distracting, (d) support the homeostatic model.

___ 32. One hypothesis proposed to explain human affiliation is that it is due to (a) anxiety or fear, (b) the need for money, (c) the need for achievement, (d) the sexual motive.

___ 33. People with high need for achievement (a) set their goals so that they are sure of success, (b) set their goals so that they are likely to fail, (c) set their goals so that they have a good but not certain likelihood of achieving them, (d) will not set goals.

___ 34. In a hierarchy of motives, the one on top is usually said to be (a) physiological, (b) instincts, (c) anxiety, (d) self-actualization.

___ 35. The motivating effects of inconsistencies among our cognitions are the subject of (a) cognitive dissonance, (b) hierarchy of motives, (c) the Freudian theory, (d) homeostasis.

___ 36. Moods are (a) emotions, (b) strong emotions, (c) states of feeling, (d) motives.

___ 37. Norepinephrine acts in emotions (a) to raise pulse rate, (b) to augment clotting of the blood, (c) to enhance breathing, (d) to constrict blood vessels in the body surfaces.

___ 38. The action of the sympathetic branch of the autonomic nervous system (a) parallels that of the central nervous system, (b) parallels that of the peripheral nervous system, (c) parallels the effects of epinephrine and norepinephrine, (d) is antagonistic to emotion.

___ 39. The bodily changes in emotion (a) tell us which specific emotion is going on, (b) can indicate few distinctions of one emotion from another, (c) are the same in all people, (d) are seldom used in lie detection.

___ 40. The idea that bodily reactions cause the specific emotion we experience is central to (a) the James-Lange theory of emotion, (b) Schachter's view of emotion as an interpretation of bodily reactions in the light of the situation, (c) arousal theory, (d) the emergency theory.

___ 41. The notion of a continuum of arousal is central to (a) the James-Lange theory, (b) the emergency theory, (c) Schachter's theory, (d) arousal theory.

___ 42. Behavioral performance is said to be at its peak of efficiency (a) in a low-arousal condition, (b) at moderate levels of arousal, (c) independent of arousal level, (d) at the highest levels of arousal.

___ 43. REM sleep (a) appears in animals and human infants, (b) appears only in adults, (c) occurs in the deepest period of sleep, (d) always indicates dreaming.

___ 44. Judgments of photographed facial expressions of emotions show that emotions (a) are completely distinct from one another, (b) show no relationships with one another, (c) shade into one another, (d) produce entirely unreliable judgments.

___ 45. An ordinal scale (a) has a zero point, (b) is an equal interval scale, (c) provides a ranking of people, (d) is equivalent to a ratio scale.

___ 46. Individual differences arise when (a) a person differs over time in his own performances, (b) there are differences among people, (c) there is intraindividual variability, (d) when we use statistics.

___ 47. A standard situation in which behavior is observed and measured is (a) a test, (b) a norm, (c) a distribution, (d) a trait.

___ 48. Aptitude tests include (a) personality tests, (b) achievement tests, (c) projective tests, (d) intelligence tests.

___ 49. A tally of how many times each score occurred in a sample is called (a) a measure of central tendency, (b) the range, (c) a frequency distribution, (d) a normal curve.

___ 50. A skewed distribution is (a) a normal curve, (b) one in which all the frequencies are equal, (c) one in which all the scores fall at one value, (d) one in which there are few scores at one end and many at the other end of the scale.

___ 51. In a perfectly normal curve (a) the mean, median, and mode are the same, (b) the mean and mode differ, (c) the mean and median differ, (d) the mode and median differ.

___ 52. A measure of variability is (a) the percentile, (b) the standard deviation, (c) the standard score, (d) the median.

___ 53. In comparing a person's scores on two tests, one would use (a) means and medians, (b) the range, (c) standard scores or percentiles, (d) correlations.

___ 54. The highest relationship between two sets of scores is indicated by which one of the following correlation coefficients: (a) −.72, (b) .51, (c) .31, (d) −.32.

___ 55. The most important characteristic of a test is (a) its norms, (b) its validity, (c) its interest value, (d) its reliability.

___ 56. A t-test tells us (a) what the correlation is, (b) what the variability is, (c) what the means are, (d) whether the difference in two means could arise from sampling error.

Examination three: Chapters 13-18

___ 1. Tests which measure the results of specific training are called (a) aptitude tests, (b) achievement tests, (c) projective tests, (d) personality tests.

___ 2. In the Binet and Simon intelligence test, the items were selected (a) because performance on them was related to age, (b) because they measured simple sensory processes, (c) because by definition they measured intelligence, (d) because they were unrelated to school performance.

___ 3. A child with a mental age of 12 and a chronological age of 15 has an IQ of (a) 75, (b) 110, (c) 80, (d) 120.

___ 4. Binet's test is (a) a group test, (b) a performance test, (c) a test for adults, (d) a verbal intelligence test for children.

___ 5. The gifted children in Terman's study in later life (a) had high suicide rates, (b) had high rates of insanity, (c) took many advanced degrees, (d) failed to marry.

___ 6. Increases of intelligence test scores beyond age 30 are likely to be found on (a) power tests, (b) speed tests, (c) maze tests, (d) Binet tests.

___ 7. A decline in intelligence at later ages is found (a) first for initially bright people, (b) in longitudinal studies, (c) in maze tests, (d) in cross-sectional studies.

___ 8. Saying that someone has "lots of personality" is to use the definition that considers personality as (a) consisting of enduring traits, (b) social stimulus value, (c) a structure, (d) a way of adjusting oneself to the circumstances of life.

___ 9. A high development of muscle in one's body is indicative of (a) endomorphy, (b) ectomorphy, (c) mesomorphy, (d) all of these.

___ 10. The withdrawn, shy person is (a) an introvert, (b) an endomorph, (c) stable, (d) unstable.

___ 11. Compulsive characteristics are thought by some to represent (a) a source trait, (b) a surface trait, (c) an oral personality, (d) an anal personality.

___ 12. Striving for superiority was stressed by (a) Jung, (b) Adler, (c) Freud, (d) Watson.

___ 13. The study of honesty shows it (a) to be a source trait, (b) to reflect an oral personality, (c) to be influenced by situational factors, (d) to be a very consistent trait in children.

___ 14. The "halo" effect in personality measurement appears prominently in (a) inventories, (b) the interview, (c) projective tests, (d) experimental situations.

___ 15. Giving a story in response to pictures of people is required in (a) the Thematic Apperception Test, (b) the Rorschach Test, (c) inventories, (d) the interview.

___ 16. The Hidden Figures Test is used to measure (a) repression, (b) leveling, (c) sensitization, (d) field dependence-independence.

___ 17. Double-approach-avoidance conflicts (a) arise when there are two unattractive alternatives, (b) arise when there are two attractive alternatives, (c) arise when the choice of one attractive alternative means the loss of the other, (d) are what Freud meant by the role of conflict in neurosis.

___ 18. Escape from the situation is a solution attempted in the case of (a) the avoidance-avoidance conflict, (b) the approach-approach conflict, (c) the approach-avoidance conflict (d) the double-approach-avoidance conflict.

____ 19. The gradient of avoidance is said to be (a) not so steep as that for approach, (b) steeper than that for approach, (c) equally steep as that for approach, (d) much flatter than that for approach.

____ 20. Vacillatory behavior appears at the point (a) where avoidance is strongest, (b) where approach is strongest, (c) where the gradients are widely separated, (d) where the gradients intersect.

____ 21. Displaced aggression is seen in (a) signs of unhappiness, (b) restless behavior, (c) scapegoating, (d) aggression toward the source of frustration.

____ 22. Disguise of motives from ourselves is accomplished by (a) dissociation, (b) repression, (c) suppression, (d) rationalization.

____ 23. Giving plausible but not valid reasons for our conduct is called (a) projection, (b) rationalization, (c) repression, (d) substitution.

____ 24. People who see an undesirable trait in others, which they themselves have without awareness of it are showing (a) projection, (b) rationalization, (c) substitution, (d) dissociation.

____ 25. Some amnesias illustrate (a) suppression, (b) repression, (c) projection, (d) substitution.

____ 26. Expressing hostility in a socially acceptable and useful way illustrates (a) sublimation, (b) rationalization, (c) intellectualization, (d) reaction formation.

____ 27. The story of Theodore Roosevelt illustrates (a) projection, (b) rationalization, (c) overcompensation, (d) intellectualization.

____ 28. Impairment in **a** psychological sense is (a) statistically defined, (b) culturally defined, (c) morally defined, (d) defined as failure to meet one or more of the criteria for adjustment.

____ 29. The bulk of the mental hospital population is composed of people who (a) are neurotic, (b) have disorders arising from old age, (c) are manic-depressive, (d) are schizophrenic.

____ 30. Free-floating anxiety would be found in (a) phobias, (b) anxiety neuroses, (c) conversion reactions, (d) depressive reactions.

____ 31. An amnesia would most likely occur in (a) a dissociative reaction, (b) an anxiety neurosis, (c) a phobic reaction, (d) a depressive reaction.

____ 32. Hallucinations would tend to appear in (a) neuroses, (b) psychopathic personality, (c) psychoses, (d) mental retardation.

____ 33. It is believed that one of the following is an organic disorder: (a) anxiety neurosis, (b) conversion reaction, (c) manic-depressive psychosis, (d) general paresis.

____ 34. Elation and excitement characterize (a) schizophrenia, (b) conversion reactions, (c) the manic phase in manic-depressive psychosis, (d) general paresis.

____ 35. Inappropriate emotions (to the situation) would most likely be found in (a) schizophrenia, (b) general paresis, (c) hysteria, (d) phobias.

____ 36. Trouble with the law is common in (a) schizophrenia, (b) psychopathic personality, (c) conversion reactions, (d) general paresis.

____ 37. Important to the development of the mental health movement in the United States was (a) Philippe Pinel, (b) Sigmund Freud, (c) Clifford Beers, (d) Emil Kraepelin.

____ 38. Psychotherapeutic methods are most effective with (a) neurotics, (b) psychopathic personalities, (c) alcoholics, (d) psychotics.

____ 39. The treatment of depression by medical means currently emphasizes (a) lobotomy, (b) electric shock, (c) chemotherapy, (d) lobectomy.

____ 40. Psychotherapy devoted to motives and conflicts is called (a) behavior modification, (b) desensitization, (c) client-centered therapy, (d) psychoanalysis.

____ 41. Free association is a technique used mainly in (a) psychoanalysis, (b) client-centered therapy, (c) desensitization, (d) group therapy.

___ 42. Psychoanalysis as a therapy is most fundamentally concerned with (a) free association, (b) dream analysis, (c) interpretation and analysis of resistance, (d) conscious forces.

___ 43. The transference reaction in psychoanalysis exemplifies the mechanism of (a) sublimation, (b) projection, (c) rationalization, (d) reaction formation.

___ 44. A nondirective attitude on the part of the therapist characterizes (a) desensitization, (b) counterconditioning, (c) psychoanalysis, (d) client-centered therapy.

___ 45. Direct treatment of symptoms characterizes (a) psychoanalysis, (b) client-centered therapy, (c) group therapy, (d) behavior modification.

___ 46. Token economies exemplify a technique employed by therapists who use (a) behavior modification, (b) psychoanalysis, (c) client-centered therapy, (d) existential therapy.

___ 47. Early studies of group versus individual performance showed that the group situation improved (a) the accuracy of performance, (b) the speed of performance, (c) neither, (d) both.

___ 48. Groups heterogeneous with respect to personality test scores (a) were better satisfied with their problem solutions, (b) produced poorer quality solutions, (c) produced better quality solutions, (d) produced the same quality of solutions as other groups.

___ 49. The cohesiveness of groups is (a) always helpful to productivity, (b) never conducive to productivity, (c) conducive to productivity if that is the group goal, (d) reduced under external threats.

___ 50. Performance in groups tends (a) to become more uniform, (b) to become less uniform, (c) to remain heterogeneous, (d) not to change in uniformity as the group works on problems.

___ 51. Capitulation to group standards occurs in subjects who are (a) high in ability, (b) firstborn children, (c) high in originality, (d) self-confident.

___ 52. The assumption of the leadership role is influenced by (a) intelligence, (b) dominance, (c) situational factors, (d) all of these.

___ 53. The greatest aggression was found in the group that was (a) led in a laissez-faire manner, (b) led democratically, (c) led autocratically, (d) none of these.

___ 54. To obtain people to be interviewed in a public opinion poll, one should (a) use his friends, (b) use a very carefully selected sample of people, (c) use bypassers on a street corner, (d) take every fifth name from the telephone book.

___ 55. Getting people to obey a message is most effectively done by (a) inducing a moderate level of fear, (b) inducing a high level of fear, (c) not using fear, (d) using a one-sided message.

___ 56. Overcoming prejudice by contact with other groups seems to depend on (a) instruction, (b) sheer contact, (c) contact with unequal status for the groups, (d) contact with equal status for the groups.

Answers for Examinations

EXAMINATION ONE–CHAPTERS 1-6

1. (b)
2. Nativism
3. Empiricism
4. (a)
5. (d)
6. (c)
7. Clinical psychologist
8. (d)
9. The blood and circulation
10. The nervous system
11. (c)
12. (b)
13. (b)
14. (a)
15. (d)
16. (d)
17. (c)
18. (a)
19. (b)
20. (b)
21. (a)
22. (c)
23. (a)
24. (d)
25. (d)
26. (b)
27. (c)
28. (a)
29. (b)
30. (c)
31. (b)
32. (a)
33. (c)
34. (d)
35. (b)
36. (a)
37. (c)
38. (d)
39. (c)
40. (b)
41. (d)
42. (a)
43. (b)
44. (c)
45. (d)
46. (a)
47. (c)
48. (a)
49. (b)
50. (d)
51. (b)
52. (d)
53. (c)
54. (a)
55. (c)
56. (a)
57. (d)
58. (b)

EXAMINATION TWO–CHAPTERS 7-12

1. (c)
2. (c)
3. (b)
4. (d)
5. (a)
6. (d)
7. (a)
8. (b)
9. (a)
10. (b)
11. (c)
12. (d)
13. (a)
14. (a)
15. (c)
16. (b)
17. (d)
18. (b)
19. (a)
20. (d)
21. (b)
22. (c)
23. (a)
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32. (a)
33. (c)
34. (d)
35. (a)
36. (c)
37. (d)
38. (c)
39. (b)
40. (a)
41. (d)
42. (b)
43. (a)
44. (c)
45. (c)
46. (b)
47. (a)
48. (d)
49. (c)
50. (d)
51. (a)
52. (b)
53. (c)
54. (a)
55. (b)
56. (d)

EXAMINATION THREE–CHAPTERS 13-18

1. (b)
2. (a)
3. (c)
4. (d)
5. (c)
6. (a)
7. (d)
8. (b)
9. (c)
10. (a)
11. (d)
12. (b)
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48. (c)
49. (c)
50. (a)
51. (b)
52. (d)
53. (c)
54. (b)
55. (a)
56. (d)

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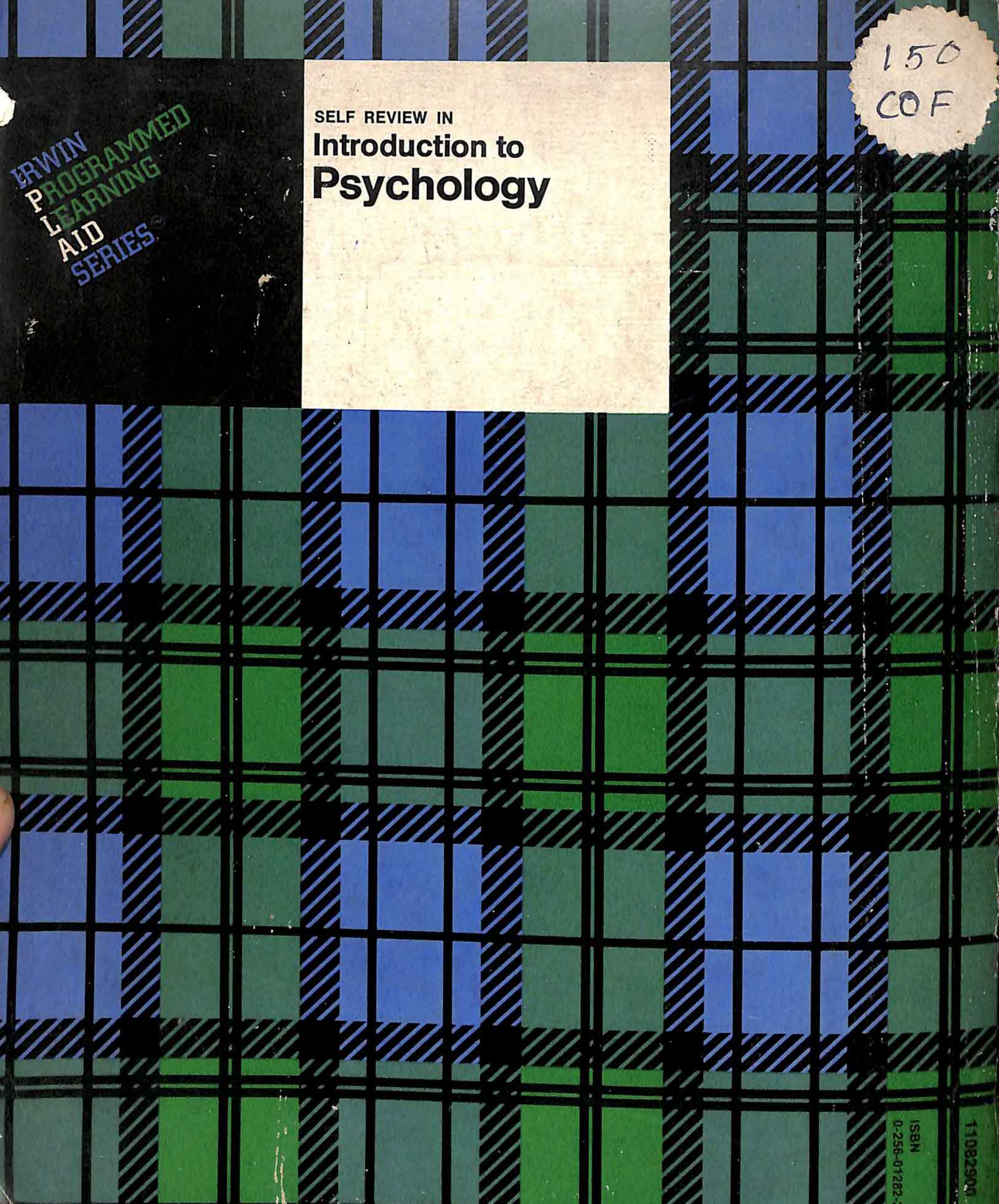

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